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Green Community Act: Town of Charlton

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Green Community Act

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by

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Abstract

This report shows the process required to designate the Town of Charlton as a Green Community under the 2008 Massachusetts Act. Charlton had begun this process, but then let the effort lapse when it met resistance. We were able to revitalize that effort. Our work shows the necessary research, data gathering, figures interpretation, cost analysis, local political study and essential recommendations to put Charlton on a viable path toward Green Community Status.

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Background

In an attempt to curb energy use and carbon dioxide emissions, the Commonwealth of Massachusetts passed the Green Communities Act in 2008. This Act created the Green Communities Program which incentivized individual towns in the Commonwealth to adopt measures to be more energy efficient. Compliant towns earn the title of "Green Community" and are eligible for grants from the state to fund energy efficient projects. So far, there are 86 green communities (figure 1) out of the 351 towns and cities in Massachusetts. A municipality must satisfy all the criteria set forth in the Green Communities program. These criteria target all facets of the community. Care is given to establish an environment in town to allow and promote the construction of an alternative energy producing facility and clean energy research and development or manufacturing buildings. It also aims to reduce energy use by the town by its residents, businesses, and municipality. These objectives are split into five explicit criteria which can be generally met in a variety of ways.

Our IQP group has chosen to help a town achieve "green communities" status. Our group consisted of three juniors –one ECE major, and two civil engineering majors. One of the group members was a member of Charlton's Finance Committee so the group had a connection to the town. Having this personal connection allowed us to easily contact and maintain dialog with town officials.

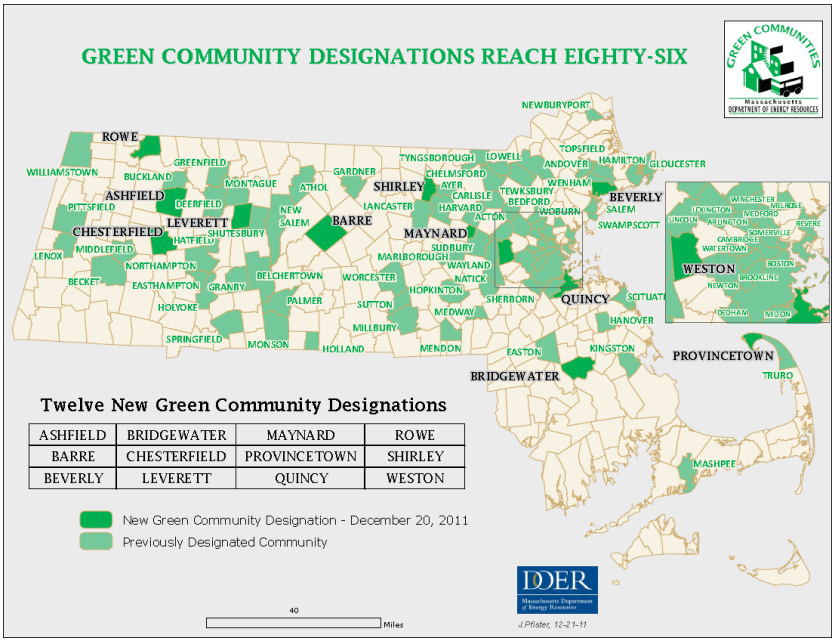

Figure 1. Green Community Designations

We chose the Town of Charlton for this town. Charlton has been working towards green community status since the act was passed in 2008. Charlton's progress stalled after only accomplishing a little headway due to loss of support, lack of available man power, diminished ambition, and other difficulties. Our goal here is to assist Charlton and reinvigorate its drive to become a green community. Our group's job was to perform the necessary research, communications, documentation, and data gathering and organization. We evaluated where Charlton was in terms of compliance with the Act when we first started our project. From there we worked with representatives from the Department of Energy Resources (DOER), town officials, and citizens of Charlton and nearby towns. After we did as much as we could for this project, we developed a plan for the town to follow after the conclusion of our project.

Requirements

The first two criteria promote alternative energy. Criterion 1 establishes an "as-of-right siting of renewable or alternative energy research and development or manufacturing facilities" (Guidance for As-of-Right Siting) in the community. To comply with this criterion, a town basically needs to have a zoning layout that allows facilities that produce, manufacture, or research alternative energies. "Most industrial, light industrial, commercial, and mixed-use districts allow R&D and manufacturing facilities." A firm who wishes to build a facility in one of these categories will not have to "need a special permit, variance, amendment, waiver, or other discretionary approval." Ample space to construct such a facility must be presented. There must be at least 50,000 square feet available space for some combination of new construction and vacant property. (Guidance for As-of-Right Siting)

Criterion 2, like Criterion 1, deals with ensuring that new manufacture or research facilities are encouraged to be built in the community. Specifically, it deals with the expedited application and permitting process for the as-of-right energy facilities talked about in Criterion 1. The facility's

application must be processed within one year of the application. The community can achieve this by passing local laws and regulations concerning permit issuance “such that all local permitting applicable to the siting and construction of clean energy facilities within the relevant zoning district(s) can be issued within 1 year of submission of a completed application” (Guidance for Expedited Permitting). Alternatively, the community may apply the expedited permitting process of MGL Chapter 43D –which has a required deadline of 180 days to the as-of-right districts –to fulfill Criterion 2. Also to be compliant, the community must report annually with the DOER about the permitting of clean energy within the as-of-right zoning districts. (Guidance for Expedited Permitting)

Criterion 3 is the most formidable challenge of the Green Communities Program. The town must perform an energy base line study where they must take a complete inventory of the use of energy by every municipal (both town and school) building and vehicle. There are many exceptions, however. For example, if a school building is part of a regional school district and not part of a town district, then that building is exempt. This inventory must include all energy use like heating, cooling, lighting, electronics and appliance use, and the like. After this inventory is completed, a plan must be formulated to reduce overall energy use by at least twenty percent over the next five years. It is recommended that the established “base line” is the most recent year, but the Act allows the town to go back a maximum of three years. Criterion 3 states that the town has the discretion to decide whether to use calendar or fiscal years. The five year plan must start from the baseline year. The municipality, like for Criterion 2, must report annually to the DOER with its current status. (Energy Reduction)

Criterion 4 is the most focused out of the five criteria. To fulfill the requirements of Criterion 4, the municipality “must purchase only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and practicable.” (Guidance and Model Policy) The goal here is to reduce overall energy use consumed by vehicles and, by virtue, reduce carbon dioxide emissions. The criteria itself is quite prescriptive; for each category of vehicle there is a corresponding combined city and

highway rating the vehicle has to meet or beat. For example, a two-wheel drive car must be rated at least 29 miles per gallon and a four-wheel drive standard pick-up truck must achieve an efficiency of at least 16 miles per gallon. Also, any vehicles that are hybrid or electric automatically meet this criterion. It must be stated that there are many vehicles exempt from a minimum efficiency. All heavy-duty vehicles in the town's fleet that are over 8,500 pounds are exempt. Fire engines, ambulances, and most public works vehicles fit this description. "However, municipalities must commit to purchasing fuel efficient cruisers, passenger vans, and cargo vans when they become commercially available." (Guidance and Model Policy) To "promise" to purchase to these standards can be easily accomplished by means such as the Board of Selectmen or Town Council passing a motion that sets the prescribed standards. (Guidance and Model Policy)

The most controversial part of the Green Communities Program is Criterion 5 –minimizing life-cycle energy costs for new construction. Criterion 5 is the part of the Green Communities program that targets energy reduction in the private sector –the commercial and residential side of town. This can be accomplished many ways as long as the town sets a building standard that roughly increase the energy efficiency of new construction by roughly twenty percent based of off the 2009 International Building Code (subject to approval of the DOER). The most common way a community achieves this goal is by adopting the 780 CMR 115.AA, the "Stretch Energy Code," optional amendment to the Massachusetts building code. In most towns, this requires a majority vote at Town Meeting to pass the Stretch Code as a by-law. This code requires builders to build to a new minimum energy requirement for new structures, remodeling, and additions. This code has prescriptive guidelines, but does not mandate that the builder follows them exactly. There is flexibility in the sense that the builder just has to meet the efficiency standard to pass inspection. The builder may achieve this any way he desires as long as it meets the overall energy reduction. (Stretch Code Adoption Process)

Benefits

The Green Community Program Administrators are seeking to increase, very substantially, the level of savings derived from energy efficiency activities, consistent with the bold actions contemplated under the Act. In particular, this Plan calls for cumulative savings on an overall statewide basis of 57,402,198 therms over the three-year period and 897,481,544 lifetime therm savings. As a result of these savings, CO2 emissions will be reduced by approximately 5,269,604 million short tons over the life of those savings. This achievement is comparable to the environmental benefits achieved by taking approximately 876,000 cars off the road, by annually sequestering carbon in a pine forest roughly the size of the 21 percent of the entire state, or by recycling 1.65 million tons of waste instead of sending it to the landfill. (NationalGrid)

The savings goals and program budgets set forth in this Plan are presented on an aggregate, statewide program-level basis within three major customer sectors (residential and low income). In each Program Administrator is setting forth its own recommended savings and budget levels for the three-year period commencing January 1, 2010, consistent with the overall goals and budgets developed in the statewide Plan review process. The Program Administrators note that this phased process complies with the Act, which first requires the development of a joint statewide plan by all Program Administrators in April 2009, followed in October 2009 by individual PA-specific plans, after the Council has concluded its review of the statewide plans.

In developing today's proposed statewide goals and budgets, each Program Administrator was tasked with submitting to the full group of Program Administrators its own updated PA-specific proposed savings goals and budgets for the three-year period. These proposals were subject to a review process that allowed for adjustments to be made by all Program Administrators based not only on peer review, but also upon (a) the presentations made at the Council meetings by the Consultants, (b) Council

discussions regarding the savings goals and budgets advanced by the Program Administrators in their April 30 and July 16 filings and (c) discussions and negotiations with the Council's Consultants. The savings goals and budgets presented on a statewide basis by the Program Administrators today represent the results of that iterative process. The aggregate savings goals and budgets presented individually by the Program Administrators in their individual, PA-specific filings are generally targeted on, and flow out of, the overall goals developed in the statewide Plan review process.

In addition to economic benefits, efficiency resources bring significant environmental benefits that reduce air pollution and improve air quality in Massachusetts and in the region. The efficiency programs and initiatives included in this Plan are aimed at reducing the amount of electricity and natural gas required to run the Commonwealth's economy. By reducing the amount of energy consumed in all sectors of the economy, important air and water benefits are delivered. Decreasing energy consumption results in less demand for energy from fossil fuel powered plants and natural gas pipelines. By reducing plant operation time, emissions of air pollutants and greenhouse gases can be reduced.

Challenges

For purposes of this statewide Plan, the Program Administrators have also assessed "the estimated lifetime cost, reliability and magnitude of all available energy efficiency and demand reduction resources that are cost-effective or less expensive than supplied." (General Law) In particular, the Program Administrators have specifically set forth the estimated costs associated with the available energy efficiency proposed for the Plan. Based upon many years of experience and study, the Program Administrators have also assessed the reliability of energy efficiency resources and note that energy efficiency resources have proven to produce persistent savings and be reliable over the extended life of installed measures; indeed, energy efficiency has been a notably reliable part of the services that Program Administrators have provided over many years. The Program Administrators have similarly

provided an assessment of the magnitude of the benefits and costs associated with obtaining these resources. Without limiting future assessment activities, the Program Administrators recommend that a comprehensive technical potential study be performed during the period 2010-2012 that targets both electric and gas end uses. Such a technical potential study will be a useful tool in future assessments under the Act.

The current depressed housing market offers both opportunities and challenges for the Program. On one hand, a more competitive housing market provides an opportunity for the Program to attract builders interested in finding ways to differentiate themselves and their homes. The message to these builders will be that by building ENERGY STAR-qualified homes they will be able to differentiate themselves in this tough market as builders who deliver a superior product, and that the Program provides marketing support to help them sell their ENERGY STAR homes. On the other hand, a depressed housing market makes it more difficult to attract builders who think the only way to be competitive is to keep their home prices low.

Previous Projects

When looking for resources to refer to for Charlton's application, we noticed that there were samples of the completed criteria from other Green Communities. Having the completed criteria from current Green Communities proved to be a valuable resource to our project. These references not only provided guidance for completed the specified criteria, but were evidence that Charlton can realistically meet the objectives stated by the Grant Program. One resource that we found particularly useful was the Energy Reduction Plans (ERPs) provided by the DOER for towns that had recently obtained Green Community status. Currently available on the DOER websites for the towns of Ashfield, Barre and Rowe, these ERPs provide guidance for towns with similar characteristics in terms of population and land size as Charlton. In these samples, we referenced insulation and other energy conservation measures that

might be applicable to Charlton. Although some examples, such as Ashfield's suggestion to close the Town Hall during the winter months as an energy conservation measure, cannot be applied to Charlton's frequently-used buildings, other measures listed are applicable and may even be funded by the grant monies or through additional rebate program suggestions (Sample Energy Reduction Plans, Leverett). The other Green Communities were also a great resource in terms of finding methods to advocate the Stretch Code building appendix, a criteria that is especially controversial to building contractors and which must be approved by the town through a Town Meeting. Search results for "Massachusetts Green Communities Stretch Code Presentation" provide PowerPoint presentations presented by current Massachusetts towns and cities that have hosted or distributed supporting material for the Stretch Code. Many towns have adopted the Stretch Code appendix to their existing building codes – 105 communities, to be exact, as of November 16, 2011 – but not all have successfully completed all 5 criteria for becoming a Green Community (Stretch Code Adoption, by Community). With all of these resources, we helped Charlton in their process to becoming one of the many Green Communities in existence today.

Charlton

According to the draft "Green Communities Action Plan for Charlton," the Town of Charlton is currently only in compliance with Criteria 1. Charlton's Zoning Bylaw (last amended in October 2008) includes a Business Enterprise Park (BEP) District and an Industrial General District (IG) which allows for research and development and light manufacturing, respectively. Also, for every other district, besides the Village District, allow as-of-right zoning for wind generation. To officially meet this criterion, Charlton only needs to provide a letter from the Town Counsel confirming that Charlton BEP zoning district does, in fact, allow for Research and Development, the IG district does allow for renewable energy/alternative energy (RE/AE) manufacturing, and these other districts allow wind generation. This

letter will also have to provide yield calculations or statements that there are adequately zoned sites for the construction of facility/facilities of 50,000 square feet as described in Criteria 1. Lastly, this letter "will also confirm that any permitting procedures that require a Special Permit are not required for RE/AE R&D or manufacturing uses that may be proposed within sites in the BEP district." (Green Communities Action Plan)

Charlton has not adopted the Chapter 43D Expedited Permitting Program, which is recommended satisfying Criteria 2. There are currently no guidelines or mechanisms in place to require that permits are issued in a timely manner. The town, however, does not take a whole year to approve permits. Typically, all permits are processed in a timely manner. Virtually, the town already complies with the criterion; there are no regulations in place that would prevent the permit of a facility designated in criteria 1 from receiving approval in more than a year. Specifically, "the town has no wetland bylaw and issues five or so local permits through a permitting process that does not typically last longer than one year." (Green Communities Action Plan) To comply with the criteria, Charlton must provide a letter to the DEOR stating that nothing in the town's rules and regulations relating to the permitting process will delay permitting for RE/AE facilities for longer than 12 months.

Criterion 3 is easily the biggest portion of the Green Communities Program. So far, Charlton has done little to be compliant. Representatives from the town have met with members of the DOER and have discussed what needs to be done and how to do it. The first thing Charlton has to do is take a complete inventory of all the buildings, equipment, and vehicles the municipality owns that uses energy. All the schools in Charlton do not have to be considered because they are part of a regional school district and they are not owned by the town. Charlton receives its energy from National Grid and receives water from the town of Southbridge. The amount of energy used needs to be quantified for at least 3 years back. This is achieved by researching past energy consumption such as reviewing old electric bills or how much gasoline a certain department used. After this inventory is complete, Charlton

must begin to work on a plan to reduce energy use by twenty percent over five years. This plan may use the year the town is applying for Green Community status or up to two years prior as a baseline year. Past, present, and future efforts must be considered in this plan. Recently, the town has taken some measures to reduce energy use such as installing motion sensors –which control lighting –in the town hall. This may be considered in the plan, but much more will be needed. The plan will have to be developed and include a wide range of changes from lighting improvements to the implementation of alternative energy systems. After this plan is developed, it must be accepted by the Board of Selectmen. As with the other criteria, proper documentation including the results of the inventory, the draft of the reduction plan, and the adoption of the plan must be written.

Criterion 4 requires an inventory of the fleet of Charlton's municipal vehicles. The vehicles that are or are not exempt must be identified. Currently, there are approximately three vehicles owned by the town that are required to adhere to the efficiency standard. Once again, the schools of the town are exempt. Charlton must draft and adopt a policy that sets the standards, as laid out in Criteria 4, by the Board of Selectmen. Proper documentation, including a copy of the policy, the inventory of the existing town fleet, and documentation that the general government has adopted the policy, must be sent to the DOER.

For Criteria 5, all Charlton has to do is pass a bylaw that amends the town's building code to adopt the Stretch Code. The town would have to pass the bylaw at Town Meeting with a majority vote. The only problem is actually gathering up enough support to ensure it passes. The Stretch Code bylaw has already been shot down by Town Meeting due to the perception of the stretch code as a "government mandate" and that it will hinder the local building industry. Charlton, so far, has held two informational meetings in regards to talking about the Stretch Code. More meetings will be needed as well as public support from local officials and contractors. Interviews with the local paper will also help spread awareness of the code. (Green Communities Action Plan)

Politics

The town of Charlton is a medium sized town located south-west of Worcester and approximately 50 miles west of Boston. As of the 2010 census, there are about 13,000 residents living in Charlton. The town has an open town meeting form of government with a five member Board of Selectmen. The Board of Selectmen (BoS) is the executive branch of the town and is responsible for overseeing other boards and subcommittees, negotiating contracts, passing basic regulations, appointing employees, and setting certain fees. Charlton's BoS Currently consists of Chairman David Singer, Vice-Chairman Kathleen Walker, Brent Sellew, Peter Boria, and Rick Swenson. Town Meeting is open to any registered voter and is the legislative body of the town; this is where all bylaws, the budget, account transfers, and other regulations are voted on. Charlton usually holds one annual meeting in May and a special Town Meeting in October.

Like other large towns, Charlton has a town administrator that oversees the town on a day-to-day basis. Charlton's Town Administrator is Robin Craver and she is responsible for performing most of the administrative duties of running the town under direct guidance of the BoS. Craver is the person our group has talked to the most. She is currently "in charge" of Charlton's Green Community project. Her two administrative assistants, Mary Devlin and Kara Hmielowski, were also a main point of contact since they performed much the information gathering our group needed.

Performing our research, our group had to keep regular contact with the various department heads in town. These people are in charge of the major departments such as the Police Department. The main three people were Police Chief James Pervier, Fire Chief Charles Cloutier, and Highway Superintendent Gerry Foskett. Town planner Alan Gordon was also a regular person of contact to assist us with Criteria 1 and 2 and other zoning information. Building Commissioner Curtis Meskus was a valuable resource of information concerning the stretch energy code, contractor contact information, and building facts about the Town Hall.

When Charlton started to begin the process to become a green community, the BoS created and appointed members to the Energy Committee. This committee would be charged with the task of coordinating this project. The group had several meetings where they discussed strategies and set goals for their project. With the town, they coordinated an information session on the Stretch Energy Code for Charlton. This meeting was met very negatively by citizens and local contractors citing that they did not need more regulation. After this informational meeting, a lot of steam was lost for the Charlton's Green Community Status because it seemed that the Stretch Energy Code would not pass at Town Meeting. Currently, the Energy Committee only has 3 out of 5 members and they do not meet anymore.

Purpose

The purpose of this IQP is to work with the Town of Charlton to achieve Green Community status. Charlton has been interested in becoming a Green Community since the act passed. On August 11, 2009 Charlton established the 'Green Committee' –a subcommittee composed of five citizen whose job it was to work on Charlton Green Community status. "In the summer of 2009, Charlton submitted an application for Green Communities Planning Assistance to the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs Department of Energy Resources" to receive assistance with organizing and create an action plan. Along with the application, the Charlton Board of Selectmen sent a letter of commitment to meet all five criteria in one year (never accomplished). The organization agreed to help Charlton. In August 2010, a draft of a "Green Communities Action Plan" was created. This plan contains background on each of the criteria and where Charlton currently stands (at the time of the report) in satisfying the criteria. After an information session about the Stretch Code, all momentum ceased because of the overwhelming opposition of town citizens and contractors.

Since there is not ambition left to pursue Green Community status, we came to try to jumpstart the initiative again. We were act as advocates for all parts of the act and preformed research to not only

better our own understanding but bring awareness to the citizens and employees of Charlton. We oversaw all operations and guide the progress relating to the five criteria. We met with all levels of local government, talked to representatives of current Green Communities, contacted local media, and preformed the necessary field work. We tried to make a real difference.

Methodology

Interviews

A great deal of research was needed for this project. This went well beyond researching historical trends of electricity use in the town hall or looking up the fuel efficiencies of four-wheel drive vehicles. There is a huge social aspect to this project. A fantastic way to gather information was to have meetings with professionals involved with the Green Community Act, nearby experts, and native local leaders. We also proposed to conduct a lot of in-person and email communication with professionals related to green energy and to the objective of this grant program. We will also reach out to local people like building contractors to develop a better grasp on the stretch code.

Kelly Brown, the Regional Coordinator for the Green Communities Division of MA Department of Energy Resources, was our greatest asset. She is well versed in the knowledge of the Green Communities Act and has worked with many towns to achieve Green Community Status. Brown assisted our group by teaching us various techniques and aspects of the Act and guided us concerning the completion of the five criteria and the application process.

We advocated and drafted actual legislation that the town will be voting on. We met with the Charlton Board of Selectmen as they are the executive branch and de facto leaders of Charlton. The current members include Chairman David Singer, Vice-Chair Kathleen Walker, Brent Selew, Rick Swenson, and Peter Boria. Along with the Selectmen, another very important figure we met with was

Town Administrator Robin Craver. Craver is in charge of day-to-day operations of the town. She is a wealth of knowledge in the workings of Charlton and has directed our group to the people we needed to talk to. We also met with Alan Gordon, the Town Planner, as well as the planning committee regarding Criteria 1 and 2. Curtis Meskus, Charlton's building commissioner, was also a wealth of information regarding opposition to the adoption of the Stretch Code. Lastly, we interacted with a variety of municipal departments, such as the Police Department and Highway Department, in the town to preform our energy study and to develop our Energy Reduction Plan. (Departments, Boards, and Committees)

Energy Reduction Plan

Criterion 3 of the Green Communities Grant Program focuses on the creation and implementation of an Energy Reduction Plan (ERP). In order to complete the desired goal for the municipality, we must obtain information regarding energy usage for the following divisions and departments: all municipal buildings and vehicles, street and traffic lighting, drinking water, and wastewater treatment plants, pumping stations and open spaces owned by the municipality. (Energy Reduction Action Plan (ERP) Guidance and Outline) The required information must be presented "on an MMBtu (Million British Thermal Units) basis," (ERP Guidance and Outline) and there are provided resources by the DOER in terms of compiling the necessary data in the requested format. As stated earlier in the section labeled "Charlton," Charlton is exempt of including both school buildings and both drinking water and wastewater treatment plants in their presentation of information and in the calculation of an ERP. A Calendar Year (CY) must also be determined as the Baseline Year, which is the year that we will need to acquire the data that will be used in formulating the ERP. This Baseline year, as previously stated, can be up to two years before the application year should the town of Charlton wish to claim credit for previously implemented energy-efficient methods. (ERP Guidance and Outline) Finally, depending on what year Charlton uses as their baseline, the Action Plan requires an

implementation of a plan that will reduce the energy consumption from the provided year "by 20% within the 5 year period following the Baseline Year." (ERP Guidance and Outline)

First and foremost, we established what our goals are in reducing the energy usage for the town of Charlton. Through our research, we saw where there is an excess in energy usage and decided what reasonable measures can be taken to prevent and decrease this usage, as well as how to educate the townspeople on how best to keep this number low. Then, when actually creating the plan, we decided on what year will be used for the town of Charlton when assessing the energy usage of the municipality before collecting date and optional energy audits, which was beneficial in contemplating the reductive measures required of the Green Communities Act. Once this was designated, we focused on each area of interested beckoned by the Criterion. When measuring energy usage for each resource in Charlton, we had to remember that fuel types include: Electricity, Natural Gas, Fuel Oil, Propane, Gasoline, and Diesel.

Municipal Buildings

The first area of energy usage that we looked at for the town of Charlton is in the municipal buildings located in Charlton, or those buildings owned by Charlton. These include: the Town Hall, Community Center, Library, and others. We remembered that the schools in the town of Charlton are members of the Regional school district and thus are not buildings owned by the municipality; basically, they will be exempt from our calculations. We determined which other buildings also fall under this criterion. Once this list was compiled, we used one of the four tools provided by the DOER to measure the amount of MMBtus used in the Calendar Year (CY) established as the baseline. To do this, it was beneficial to acquire as many, if any, energy audits are available for the determined Baseline Year. We easily estimated that municipally owned buildings will be the largest contributors to the inefficiency of energy usage in Charlton due to the fact that the sum of each fuel type used by the buildings will be

substantially higher than those for the other three categories listed (with the exception of Gasoline and Diesel).

Vehicles

The municipally-owned vehicles were analyzed for energy conservational purposes. We determined which of these vehicles are exempt and which are not, and from those we repeated the same procedures as described above to effectively calculate the MMBtu usage in the Baseline year. We remembered, however, that under the category of Vehicles is also the usage of gasoline and diesel by Charlton. We calculated the fuel consumption for each individual vehicle model and for all vehicles in aggregate to include in our Energy Reduction Plan.

Water/Sewer

For Water and Sewer, we found how many, if any, Treatment Plants there are in Charlton. We also counted the number of Pumping Stations there are in Charlton. The ERP also required a list of sources for these facilities. Should the municipality have to account for any of these resources in their energy plan, we will once more use the DOER MassEnergyInsight tool to calculate MMBtu usage.

Street and Traffic Lights

We had to first determine if street lights were owned by the utility company, National Grid, or by the town. Because these were owned by National Grid, we did not require the assistance of MassEnergyInsight to include the totals for street and traffic lighting into our Energy Reduction Plan.

Stretch Code

In July 2009, Massachusetts became the first state to adopt an above-code appendix to its state code – the 120 Stretch Energy Code. The 'Stretch' Code is an enhanced version of the 2009 IECC with greater emphasis on performance testing and prescriptive requirements. It was designed to be

approximately 20 percent more efficient than the base energy code - the IECC 2009 for new construction, with less stringent requirements for residential renovations.

It divides commercial buildings by size and type. Buildings less than 5,000 sq. ft., "specialty buildings" less than 40,000 sq. ft. (supermarkets, warehouses, and laboratories), and renovations are exempt. Buildings larger than 100,000 sq. ft. and "specialty buildings" larger than 40,000 sq. ft. must exhibit a 20 percent reduction in energy use from ASHRAE 90.1-2007 using approved energy modeling. Buildings between 5,000 and 100,000 sq. ft. can meet the same performance requirements or a prescriptive code based on a codified version of New Building Institute Core Performance Guide, which includes more stringent building envelope and HVAC equipment requirements than the 2009 IECC and new requirements for commissioning, air barriers, and lighting controls.

New residential construction will require a Home Energy Rating System (HERS) score of 65 or less for homes 3,000 sq. ft. and larger; and 70 or less for those smaller than 3,000 sq. ft., as well as compliance with the ENERGY STAR Qualified Homes Thermal Bypass Inspection. Additions must meet the same performance requirements, whereas renovations will require a less stringent HERS rating (80 or 85 for homes 2,000 sq. ft. and larger or smaller, respectively). Both can also comply with ENERGY STAR for Homes prescriptive requirements, plus meet or exceed 2009 IECC insulation requirements.

Home Energy Rating System (HERS)

Basing ENERGY STAR qualification criteria on Home Energy Rating System (HERS) performance made the Program accessible to all builders. The Program is a fully integrated gas and electric program managed by the JMC, a consortium of electric and gas Program Sponsors. Stretch Code demands HERS rater services outside the Program may increase substantially. To ensure there are enough certified HERS raters available to meet both the Program and code enforcement needs, the Program's

implementation contractor will be a HERS provider of last resort to help new raters become established as part of the open market structure.

HERS raters play a critical role in the Program. HERS raters are the main contact with participating builders, providing support and on-site training as well as conducting inspections. In 2008, the Program introduced an open market process under which participating builders are able to choose their preferred HERS rater. All HERS raters working with participating builders will receive training on new technologies incorporated into the Program, thus ensuring raters are not only able to explain and promote these technologies, but also able to teach builders how to best incorporate them into their building process.

The demand for HERS rater services outside the Program may increase substantially as Massachusetts building codes are revised, and BBRS requires that certified energy inspectors enforce energy code requirements in all buildings. To ensure there are enough certified HERS raters available to meet both the Program and any future code enforcement needs, the Program's implementation contractor will be a HERS provider of last resort to help new raters become established as part of the open market structure. Additionally, the Program will continue to play the important role of providing tight quality control over the HERS raters in an effort to ensure the highest standards and consistency of service across the state.

Incentives

In addition, the Program Administrators of the DOER support the "stretch" energy code option for local communities. The stretch code is based on Advanced Buildings Core Performance, which is supported as a voluntary program outside of stretch code communities. Program Administrator's will support the adoption of local stretch codes through continuation of upstream and/or downstream

incentive structures for a set transition period, targeted at two years after local adoption, or until the next statewide code upgrade. Incentive levels may be adjusted to respond to market conditions.

In addition, free ENERGY STAR-qualified CFL products are provided for each home. Participating homes are currently eligible for the following incentives which the program processes in addition to base incentives. Program Administrators will offer the same level of incentives in towns that adopt the stretch code. This program will coordinate with other programs such as Lighting, and Products to ensure that the program offers all available incentives that encourage deeper energy savings.

Support of the International Building Code amendments add to energy efficiency and offer incentives to municipalities that adopt "stretch code" revisions in their communities. The JMC will provide stretch code training support to towns and builders participating in the program where it has been adopted. Further details will be provided in an appendix on codes and standards.

The program will promote building science technologies which help interested homebuilders construct net zero energy homes. The stretch code support workforce development efforts through Green Jobs Act by encouraging new raters to enter into the marketplace.

In Table 1 shows a cash flow analysis of a small home (approximately 1,708 sf.) that would go through improvements under the current IECC 2009 Code and the comparison with the Stretch Code. Having a home be certified by ENERGY STAR as seem on the table there will be more annual pay back through of rebates and reimbursement the Mass Save provides to home owners.

Table 1. Stretch Code Improvement Cash Flow

Massachusetts Stretch Code Improvement - Cash Flow Small Home (1,708 sf)			
	IECC 2009 Code	Stretch Code	Stretch Code - with ENERGY STAR[3,4] -
HERS Index Modeled in REM/Rate	86	70	70
Improvement Measures (changes relative to Basecase)	- Unconditioned basement - Floor, R30 - Walls, R21 - Ceiling, R38 G2 - Heating, 80 AFUE - Cooling, 13 SEER - Water Heating, .59 EF - Duct leakage, 8% - Infiltration, 7 ACH50 - Efficient lighting, 50%	- Ceiling, R60 G1 - Heating, 94 AFUE - Water Heating, .62 EF - Infiltration, 5 ACH50 - Efficient lighting, 75% - Exhaust Only Ventilation	- Ceiling, R60 G1 - Heating, 94 AFUE - Water Heating, .62 EF - Infiltration, 5 ACH50 - Duct leakage, 6% - Efficient lighting, 80% - Exhaust Only Ventilation
Improvement Costs		$ 3,262	$ 3,643
HERS Rater Fee[1]		$ 900	$ 900
HERS Rater reimbursement[2]		-	$ (650)
ENERGY STAR Incentive[3]		-	$ (650)
Total Improvement Costs		$ 4,162	$ 3,243
Mortgage Interest Rate		6%	6%
Loan Term (Years)		30	30
Annual Incremental Mortgage Payment		$ 302	$ 236
Annual Energy Costs[5]	$ 3,754	$ 3,171	$ 3,159
Annual Energy Savings from Baseline		$ 583	$ 595
Annual Cash Flow	$ -	$ 281	$ 359

[1] Estimated Massachusetts ENERGY STAR Homes Program HERS Rater Fee (Range is from $750-$1500, but typically close to $750). Includes cost for conducting Thermal Bypass Inspection

[2] HERS Rater Fees are reimbursed by the Massachusetts ENERGY STAR Homes program by between $650-900 per unit, depending upon the HERS rating achieved.

[3] Massachusetts ENERGY STAR Homes Program may receive a minimum incentive of $650.

[4] ENERGY STAR requirements have been added to the Stretch Code package.

[5] Stretch code homes may qualify for of $1250 where the HERS rating is ~65 or lower

[6] Annual energy costs are based on most recently available fuel costs, from November 2009. Costs for heating are based on natural gas prices, the least expensive heating fuel. With oil, savings would increase.

Fuel Efficient Vehicles

The third focus of the group is Criteria 4. To comply with the criterion, the town has to promise to purchase only fuel efficient cars. As a group, we compiled a list of vehicles that satisfy the minimum fuel efficiency standard. We attempted to find every commercially available automobile that the town can feasibly procure. Along with this list, we supplied all relevant purchase data such as cost, warranty, availability, millage, and fuel efficiency. Finally, we presented our list to the Charlton Board of Selectmen. Our group worked with the Selectmen and Craver to properly draft a motion and corresponding written documentation/memorandum containing the promise and the list laid out in Criteria 4 citing the specific automobile category and minimum fuel efficiencies.

The third focus of the group is Criteria 4. To comply with the criterion, the town has to promise to purchase only fuel efficient cars. We crafted a complete vehicle inventory of Charlton's fleet. With this list, we created a template for the town to fill out the necessary information to create a database of

fleet information including information such as millage, estimated fuel efficiency, etc. With this list, our group attempted to determine which vehicles would be exempt from a fuel efficient vehicle policy and designate which vehicles are not compliant. Using this information as well as sample polices from other towns, we drafted a fuel efficient vehicle policy which we presented to the Charlton BoS.

Advocating

A large issue that we had to take into consideration when executing this Interactive Qualifying Project was the opinion of the townspeople of Charlton. Applying to the Green Communities Grant Program requires more than just an analysis of and a course of action to change the current energy usage or building code for the town of Charlton. Change brings out the reluctance of people, and we knew that through implementing the above measures we would be met with a lot of resistance. Through informational sessions, flyer distribution, and other effective methods of communication, we informed people of those concepts that are new or unfamiliar to them.

One method of advocating that we have and will continue to apply within the town of Charlton is informing the citizens of the town of the Stretch Energy Code. Because this is a Criterion that will directly impact homeowners and contractors in terms of finances, this was met with resistance due to the increase in initial cost. We made citizens of the town more aware of the code through informational sessions about the Stretch Code and its benefits to property owners, as well as through providing pamphlets about the method.

Through the aforementioned interviews, we also desired to conduct interviews with the local newspaper of Charlton in an effort to insert articles with relation to the Green Communities Grant Program. Conducting these interviews would make those readers of the article(s) generally more aware of the presence of both our student team and of the Criteria of the Grant Program.

Results/ Discussion

Criteria 1 – As-of-Right Siting

Background

To qualify as a green community, municipalities shall provide at least 5,000 ft^2 of zoning that allows the construction of renewable or alternative facilities. Examples of these facilities include solar panel manufacturers, wind turbines, and alternative energy research and development facilities.

Method for Meeting Criteria

To comply with this criterion, Charlton must provide the as-of-right siting for the types of facilitates mentioned above. This entails just having the necessary zoning in place that allows the construction of Alternative/Renewable energy facilities without having to use a special permit.

Along with the submittal of the application for Green Community Designation, Charlton will have to provide proper documentation for each Criterion. For Criteria 1, the town must provide a letter from the Town Counsel confirming that the town zoning districts do, in fact, satisfy the prescribed requirements for as-of-right zoning.

Progress Prior to Project

According to Charlton's zoning bylaw, there are many instances where required RE/AE facilities can exist. Research and Development uses are allowed without a special permit in the Business Enterprise Park (BEP) District and light manufacturing is allowed as-of-right in the Industrial General (IG) District. The Bylaw also allows wind energy conversion systems in all districts except the Village (V) District following a wind study and site plan review. Charlton is already compliant with this criterion.

Steps Completed by WPI Project Group

Since the requirements are already fulfilled by the town's zoning. Our group has prepared the information needed to submit to the DOER for review. There was a draft letter from Town Counsel

concerning Criteria 1. We submitted this letter for review to a representative from the DOER. We received feedback that the letter was satisfactory. We have sent the letter to be finalized and put on the official Town Counsel letter head.

Recommendations

Make sure that the letter is written and signed by Town Counsel.

Criteria 2 – Expedited Permitting Process

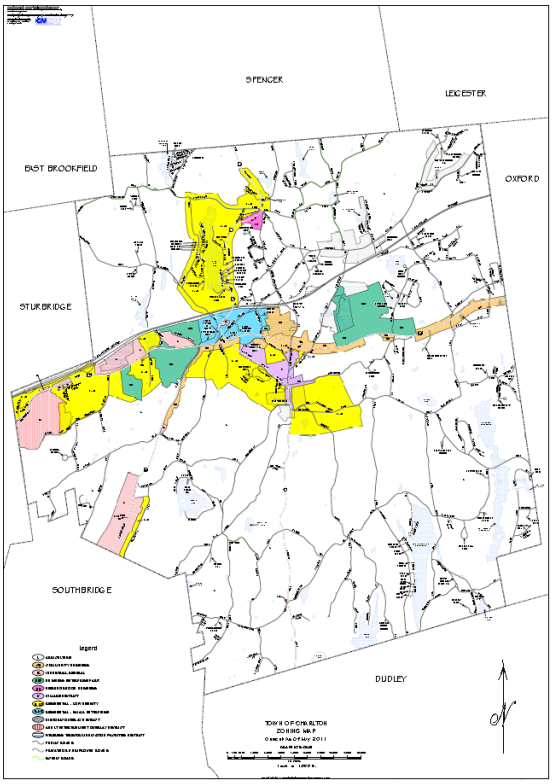

Figure 2. Zoning Ordinances

Background

The municipality needs to ensure that there is an ***expedited application and permitting process*** for the as-of-right energy facilities mentioned in Criterion 1. Construction of AE/RE facilities within zoning districts must be issued within 1 year of the completed application.

Method for Meeting Criteria

To meet this criterion, the town has the option of adopting an expedited permitting process for the facilities mentioned above. One way to satisfy this is to adopt the Chapter 43D Expedited Permitting Preprogram or a similar mechanism to set timelines for permitting approval. The town could also prove that the town has nothing in place that would cause permitting approval to last more than a year.

Proper documentation must also be completed. A signed letter form Town Council will be needed affirming that the Town is complaint with Criteria2.

Progress Prior to Project

Discussions between the DOER, Town Council, the planning office, and the Energy Committee have resulted in the finding that Charlton is complaint with this criterion by the fact that there is nothing in place that would allow the application approval process to take more than a year. It is also not typical for an application to be delayed for over a year.

Steps Completed by WPI Project Group

Like with Criterion 1, our group has verified that the draft Town Council letter is satisfactory in completing the conditions set for this criteria. We have had dialog between Charlton's planning office and the DOER to make sure all requirement are being fulfilled.

Recommendations

Ensure that a final draft of the letter is written and signed by Town Counsel.

Criterion 3 – Energy Reduction Plan

Progress Prior to Project

Before commencing the research required for Criterion 3, we tracked what work Charlton had undertaken in the past. We desired to present all of our findings from the last six months into one plan, an Action Plan. A model plan that was referenced to throughout our project work was the Green Communities Action Plan, created in August 2010 by Vanasse Hangen Brustlin, Inc. (VHB) and the Demand Management Institute. These two companies, particularly VHB, have a large focus on determining the energy efficiency of commercial buildings, which is an essential portion of Criterion 3. This Action Plan is one of many services provided to towns hoping to pursue Green Communities status by the DOER. The Action Plan from 2010, however, lacked in a large amount of critical information required to satisfy the criterion. Thus, our project team has used suggestions from this Action Plan and provided a revised, brief Action Plan for Charlton, as seen in Appendix A.

In the aforementioned Action Plan, a large amount of the basic requirements for this criterion were completed. For example, the first step that the applying community must accomplish is choosing a Baseline Year, which can be either a calendar year or a financial year, to base the Energy Reduction Plan off. As stated in the Guidance for Criterion Three, this year "should consist of the most recent year of complete data." The baseline year must also not exceed up to 3 years prior to the year of the application. Both our team and the consultant groups decided to select FY 2009, the farthest year possible, to serve as the baseline year; doing so would allow Charlton the most time possible from a year after the baseline year to claim previously taken energy-efficient measures that may be calculated towards their 20% energy reduction goal, if applicable. We also selected MassEnergyInsight as the tool for creating and sorting the Energy Baseline Inventory for the baseline years and for years thereafter, as mentioned in the Background section for this criterion.

Before working on drafting an Energy Reduction Plan, Charlton had installed energy conservation measures (ECMs) that may and will be applied to the plan once the exact dates of installation and recorded energy/financial savings have been found. The windows in Charlton Town Hall have been replaced and the heating system has been recalibrated (Green Communities Action Plan). The Charlton Public Library has been upgraded and expanded, and new or upgraded heating, cooling and lighting controls have been installed. We believe that these measures include ECMs such as controlled thermostats, multi-layered windows (for insulation purposes) and motion-sensor lighting. Until Charlton has all details required of the DOER for the Energy Reduction Plan for these specific measures, they cannot yet be placed into the ERP.

Steps Completed by WPI Project Team

Since undertaking this project, a few essential things have been completed that are beneficial to the success of meeting this criterion. B2Q, a consulting firm, has completed two energy audits within the

Town of Charlton: one for the Town Hall, and another for the Police Station. The Town Hall, one of the two recently maintenance municipally-owned buildings, had a lot of suggestions from its audit related to its HVAC system(s) and to electricity conservation recommendations. The Police Station, rated as one of the least-efficient buildings by MassEnergyInsight, also received suggestions heavily related to its electricity usage. Later on we will discuss what we felt were possible contributors to these audit results.

MassEnergyInsight is one of the most complex, intricately-detailed programs we have had to work with as part of this IQP. Through this software, users with authorization to the town's utility invoices may view the records through a series of bar graphs and tables that demonstrate and target those facilities with poor energy usage, high costs, and/or large carbon dioxide emissions. The tool is primarily for the collection of utility accounts in one central location for the purpose of satisfying the energy baseline inventory, but the analytical options available to the user help to target what buildings will help satisfy Criterion 3 the most efficiently.

When first starting to view the reports on file in Charlton's MassEnergyInsight database, we are presented a dashboard with different tabs. The first tab is a dashboard that includes the "Overall Use, Emissions and Cost" both for the town collectively and for each unit specified in the "Organize Data" section of MEI. The collective town representations are shown in percentages of the following: total use in Million British Thermal Units (MMBtu), total carbon dioxide emissions (CO_2), and total cost.

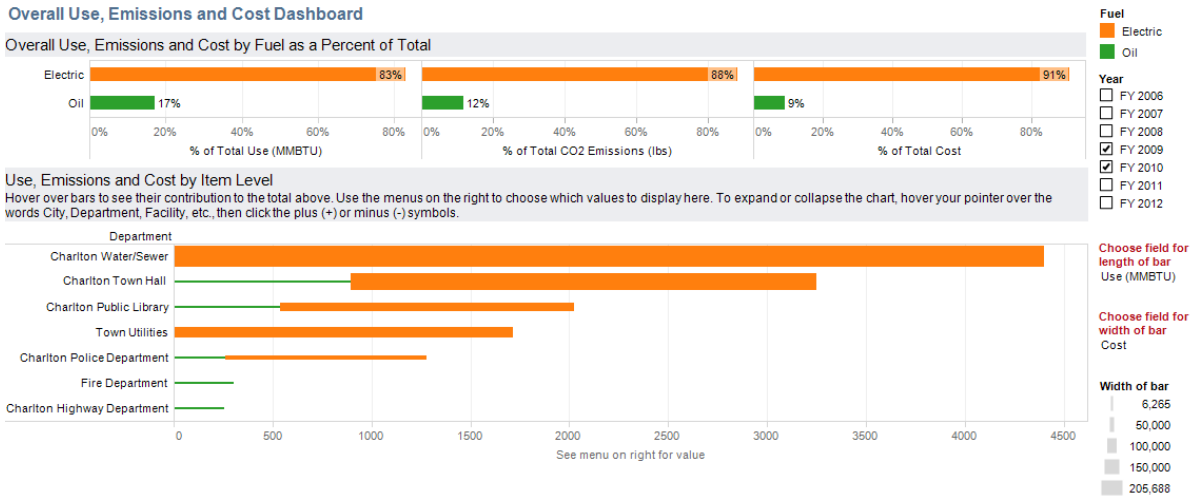

Figure 3. Overall Use, Emissions and Cost Dashboard in MassEnergyInsight

Taking into consideration the limitations we faced due to a lack of critical amounts of data, we noticed that MassEnergyInsight reports the Charlton Water/Sewer and Town Hall as the biggest consumers of FY 2009. Since there are no reports on the oil consumption for the Wastewater Treatment Facility, we know that this might be an indicator as to why the Town Hall is the leading consumer of that utility over the plant. It has been mentioned to us before, though, that the Town Hall's current HVAC system, primarily the boiler, is in need of replacements and upgrades. Thus we can safely assume that, given the information currently accessible to our group, the Town Hall is the leading oil consumer of the six municipally owned buildings.

MassEnergyInsight also provides a tab in the dashboard named "Baseline" which, when clicked, demonstrates bar graphs for however many fiscal years you've selected. These bar graphs show an overall energy use by the town, with percentages stating the difference in this amount of energy from the baseline year. There are also bar graphs that depict the energy use by facility category: buildings, or water/sewer. If Charlton was in possession of more utility-owned facilities, such as street and traffic lights, this too would have a bar graph. The facility data may also be viewed individually for each facility with respect to the total energy usage of the town for the selected fiscal years.

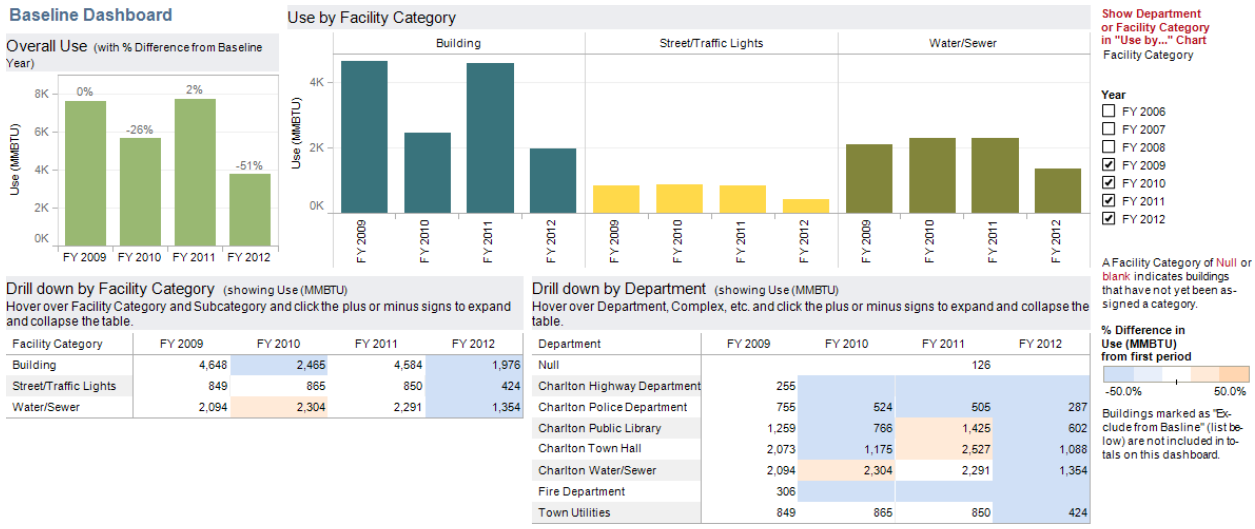

Figure 4. Baseline Dashboard in MassEnergyInsight

It can be seen that FY 2010 had a larger use in MMBtu for the Water/Sewer facilities according to the Facility Category table on the bottom left. This year, however, was also the year where the total overall usage decreased by an impressive 26%. This is, of course, taking into consideration that there is a lack of accounts for FY 2010 for a number of facilities; this explains why the building category drops in energy usage by almost half for FY 2010. Please note that because we are not yet completed with FY 2012, the numbers will be significantly lower than for those fiscal years that have already passed.

We also noticed that the Energy Reduction Plan calls for a table of all municipally owned buildings, along with their energy consumption in both natural fuel units (kWh, etc.) and MMBtu. Since this requirement may be satisfied with the table provided by MassEnergyInsight, we select the tabs labeled “Energy Reduction Plan Guidance Table 3 (Fuel Units)” and “Energy Reduction Plan Guidance Table 3 (MMBtu).”

ERP Guidance Table 3a - Municipal Energy Consumption for Baseline Year FY 2009 (Native Fuel Units)

		Electric (kWh)	Oil (gallons)
Building	Charlton Public Library	210,960	3,882
	Charlton Fire Dept.		2,199
	Town Hall	345,023	6,446
	Charlton Police Dept.	144,887	1,878
	Charlton Highway Dept.		1,833
	Total	700,870	16,238
Street/Traffic Lights	Lightposts	248,933	
	Total	248,933	
Water/Sewer	Charlton Wastewater Treatm..	533,100	
	Unassigned Water/Sewer Ac..	47,544	
	Water Pumps	33,118	
	Total	613,762	
Grand Total		1,563,565	16,238

Figure 5a. Energy Reduction Plan Guidance Table 3 (Fuel Units) in MassEnergyInsight

ERP Guidance Table 3b - Municipal Energy Consumption for Baseline Year FY 2009 (MMBTU)

		Electric	Oil	**Grand Total**
Building	Charlton Public Library	720	540	1,259
	Charlton Fire Dept.		306	306
	Town Hall	1,177	896	2,073
	Charlton Police Dept.	494	261	755
	Charlton Highway Dept.		255	255
	Total	2,391	2,257	4,648
Street/Traffic Lights	Lightposts	849		849
	Total	849		849
Water/Sewer	Charlton Wastewater Treatm..	1,819		1,819
	Unassigned Water/Sewer Ac..	162		162
	Water Pumps	113		113
	Total	2,094		2,094
Grand Total		5,335	2,257	7,592

Figure 6. Energy Reduction Plan Guidance Table 3 (MMBtu) in MassEnergyInsight

As can be seen by the above figures, the data currently provided for the baseline year, FY 2009, is incomplete. The data is primarily missing for the following: the Charlton Community Center, which is not even included in the list of buildings for the fiscal year selected; the Charlton Fire Department, due to a recent retrieval of electric accounts; and for the Charlton Highway Garage, for which we could not find an appropriate invoice for oil deliveries. The above information was still included in the draft for Charlton's Energy Reduction Plan as it is to date, which is included in the Action Plan packet mentioned earlier in this section.

MassEnergyInsight also provides a dashboard tab labeled "Buildings to Target," which is especially useful for the determination of areas to target through the Energy Reduction Plan. Although the tables and information provided leave out Water/Sewer information and the utilities listed in aggregate, it does include bar graphs and an x-y plane depicting the levels of efficiency (by cost, CO_2 emissions and kBtu/ft^2 consumptions) for all the facilities listed in Figures 5a and 5b.

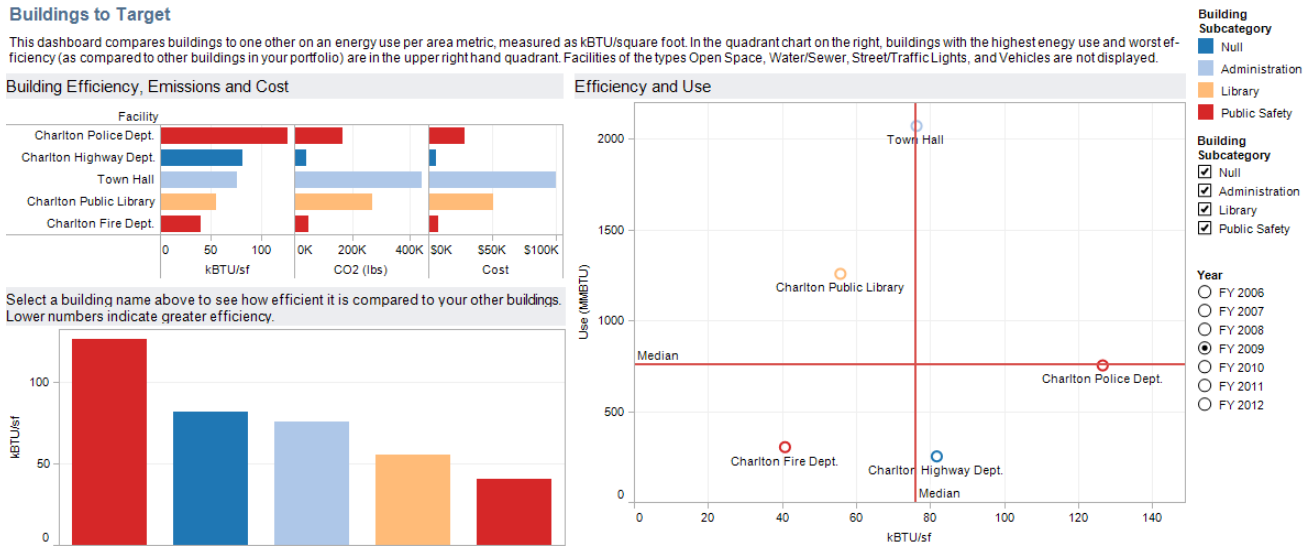

Figure 7. Buildings to Target in MassEnergyInsight

As previously mentioned, in terms of municipally-owned buildings besides the Water/Sewer facilities, the Police Department is currently categorized as the least efficient commercial building in

Charlton. Its contribution to the carbon dioxide emissions and costs are not as high as those for the Town Hall, but it does consume the greatest amount of energy for the size of the facility. The other four facilities lagged a bit further behind in this amount, but the numbers are still high and MEI does not yet have all records available for all the electric and oil accounts owned by these facilities. The Town Hall is the leading contributor to CO_2 and cost in comparison to the other facilities, thus providing the reason why Charlton had conducted an audit on the facility. Its historical architecture is another leading contributor to its numbers.

In terms of satisfying the final goal of the Energy Reduction Plan – reducing the total energy use by 20% 5 years after the end of the baseline year – the DOER provides an additional table in its Guidance to Criterion 3. This table consists of the proposed Energy Conservation Measures (ECMs), either already installed or proposed, that the town will implement and that have been calculated to reduce the energy usage by 20%, or at least by a guaranteed estimate of 15% with a proposed plan on how to obtain the extra 5%. To satisfy and fill this requirement using the provided table, we derived a list of a variety of ECMs that Charlton may want to apply. A large amount of savings can be obtained through lighting improvements, such as replacing any incandescent light bulbs with fluorescent ones. Also, electric resources such as Energy Star recommend specific lighting systems, such as T-8 and T-5 fluorescent lamps, over other manufactured types. There are also a number of improvements to be found in other utilities such as in HVAC. Due to the fact that a majority of the insulation-related or building envelope measures are better estimated with more accurate oil accounts, we provided an extensive list of cost-effective methods that the town might want to even propose using the grant program monies as funding for. This list is included in Appendix A under the “Methods for Meeting Criteria” section of Criterion 3. The measures mentioned earlier that have been taken by the town for the Town Hall and Public Library may also be included in this table.

Other energy conservation measures that the town can use its own budgets or the federal grant money to fund include energy educational programs. A recommendation listed on the B2Q energy audits, these programs teach employees and residents the essentials to using the least amount of energy possible and alternate measures of utilizing their utilities. These programs can include workshops, presentations, and even lighting demonstrations. A small item to be included on the budget, this is one ECM that can produce a faster payback period and even more energy savings due solely to energy awareness.

Should Charlton decide not to pursue the option to become a Green Community, the research provided would also be helpful to apply for rebate programs. Mass Save, a program that works with utility providers, offers resources that are essential to the application of rebate programs for both homeowners and commercial businesses. Although a majority of the provided incentives might not be applicable to the municipally-owned buildings, let alone in the Town of Charlton itself, these programs can serve as samples for the town to create town-specific rebate programs to its residents. These programs can also provide incentives in support of the stretch code appendix mentioned in Criterion 5. A sample of Worcester's, another Green Community's pilot program for energy rebates can be found in Appendix E.

Challenges Faced and Recommendations

Completing the required tasks of an Energy Baseline Inventory and an Energy Reduction Plan proved to be far more difficult than previously anticipated. Time constraints and a lack of administrative permissions prevented us from reaching our expected goals. The amount of data that is required to compile the inventory is more than we were able to obtain, and a majority of the missing information is required to calculate the required energy savings. We also had to critically think if reducing the energy usage of the municipality by 20% within the next 2.5 calendar years was a realistic goal.

As stated in the Guideline for Criterion 3, creating an inventory and drafting a plan would take a minimum of three months. Due to Charlton's lack of consistency with their MassEnergyInsight database, both access to MassEnergyInsight as a whole and to the required utility accounts for the municipally-owned buildings were delayed. Progress in updating these accounts did not commence until early to late January. This granted us with approximately two months to create a working draft of the Energy Baseline Inventory and thus the Energy Reduction plan. This is not enough time for our project team, let alone an appointed or elected Green Communities committee, to create a polished and finished draft. One thing that we have learned from completing this project is to categorize what services we will need to request authorization for long in advance, as the late request was one of the largest impacts to not receiving authentication in time.

The lack of oil and gas accounts for a majority of Charlton's buildings was another large contributor to the incompletion of the Energy Reduction Plan. Referencing to other Green Communities' Energy Reduction Plans showed that a majority of the energy savings can be attributed to insulation measures installed in poorly-insulated buildings. Since we were unable to retrieve a majority of the gas and oil deliveries, we could not see if there were poorly insulated buildings, which would serve as the most essential municipal buildings to target in our Energy Reduction Plan. An additional recommendation would be to have compiled a list of which utility companies service Charlton and, from either the individual company or from the town accountant or clerk, request all invoices from the determined Baseline Year onward.

A helpful resource for the compilation of our energy conservation measures (ECMs) were the Energy Audits. The Police Station requires a lot of maintenance to be labeled "energy resourceful," let alone in decent shape. The Town Hall is not in as poor a condition as the police station, but required more ECMs than other buildings, such as the Public Library. The missing oil and gas information, as

previously stated, also prevented the consultants from determining ECMs with relation to building envelope or HVAC improvements. However, the energy audits still include a list of recommendations, although heavily electrical and lighting related. These suggested measures not only list the item that can be installed, but include the amount of time it would take to pay back the ECM, as well as the listed energy savings for implementing the measure. A few examples of the recommendations from the audit include: energy educational programs; light-emitting diode (LED) exit signs; and programmable thermostats (Energy Audit for Charlton Town Hall, B2Q Associates). The results obtained from the audit can also be utilized by the town beyond satisfying Criterion 3, especially with the outcome of reducing utility bills.

Although many things that we had hoped to complete during this IQP are not quite finished, a vast amount of requirements have been completed. We have organized the MassEnergyInsight database has been to the best of our abilities; with this information, we have created a draft of the Energy Baseline Inventory for FY 2009; and we have compiled a list of ECMs that may be considered to satisfy the 20% energy reduction requirement. An objective of this IQP was to be able to compile the information well enough that, if it could not be completed, it can be finished by the next appointee to finish Charlton's application. Within the last couple of weeks, we were delighted to find out that there had been an assistant hired primarily to complete grant applications such as this one. Even if this assistant or any other employee appointed to a similar position does not undertake the continuation of our research towards creating an Energy Reduction Plan, the information collected will serve as a central resource for any committee or team attempting to do this or any similar energy-reducing measures.

Criteria 4 – Procure Fuel Efficient Vehicles

Background

Criteria Four of the Green Communities Program states that communities must purchase only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and

practicable. The purpose behind this criterion is to reduce carbon dioxide emissions by municipal vehicles. Many vehicles are exempt from this requirement, including: emergency vehicles, passenger vans, cargo vans, and heavy duty vehicles over 8,500 pounds.

Method for Meeting Criteria

The town has to adopt a Fuel Efficient Vehicle Policy. This policy, passed by the Board of Selectmen, must include language assuring the town follows the prescribed fuel efficiency standards per vehicle (see the attached proposed Energy Efficiency Policy for the Town of Charlton for the efficiencies 7for each specific vehicle class). The policy will also define the exemptions to the standards, the procurement guidelines, and a replacement policy.

Along with the policy, an inventory of the existing fleet must be included. This inventory will include information like year, make, model, estimated mpg, etc. This table would be used to determine which vehicles would be subject to the policy. The inventory must be updated yearly.

Like the other criteria, the town will also have to provide documentation about this criterion with the Green Communities application. Certification that the government has adopted the policy, a copy of the policy, and the vehicle inventory must be included with the application.

Progress Prior to Project

Charlton has taken no action prior to the involvement of the WPI project group in regards to Criteria 4. VHB has consulted the town about this criterion and provided information and a model policy, but no progress on the Fuel Efficient Vehicle Policy or the vehicle inventory has been achieved.

Steps Completed by WPI Project Team

The team has satisfied nearly all of the requirements for Criteria 4. A complete inventory (see attached) has been created. Included in this inventory include the department, year, make, model, year procured, VIN #, plate number, yearly mileage, fuel efficiency, annual fuel usage, and whether or not the

vehicle is exempt. A Fuel Efficient Vehicle Policy has also be drafted and proposed to the Charlton's Town Administrator and Board of Selectmen.

Challenged Faced

The challenging part of this criterion was obtaining the data to complete the inventory. Most of the information needed was scattered or incomplete. Setbacks include not being provided with enough information about certain vehicles (i.e. 4 cylinders vs. 6 cylinders, automatic vs. manual transmission, etc.).

Recommendations

We recommend the Board of Selectmen adopt the proposed Fuel Efficiency Vehicle Policy. Charlton should follow the fuel efficient vehicle replacement plan included in the policy; the town should replace the nonexempt vehicles that do not meet the minimum fuel efficiency requirements naturally as the current vehicles age and need to be replaced. The vehicle inventory should a good tool to track the mileage and fuel consumption for Charlton's fleet. This list should be kept current at least on a year-by-year basis.

Criterion 5 – Stretch Code

Current Progress

The Town of Charlton does not currently meet this criterion. Upon request by the Green Committee in 2010, VHB held a technical presentation on the Stretch Energy Code to the Board of Selectmen, Green Committee members and the general public. In October 2011 we also held a presentation to the general public highlighting the specifications of the code and associated costs. This presentation was targeted towards new and renovations of residential buildings. Our Project Group provided a copy of the presentation to the Town for outreach purposes. In October's Towns Meeting one of our WPI Project Group members Joe S. sponsored the Stretch Code to be passed, but it did not.

Challenges Faced

In Charlton we faced opposition from citizens and builders who believe that the initial costs inherent in the stretch code are too high to support its adoption. For many, it is difficult at first to see that the "life-cycle" energy savings will be greater than the initial cost. Many people don't see the value in adopting stricter building code when the general population is willing to buy homes as is. Towns have a hard time passing the stretch code because builders and code officials don't want to deal with extra hassle if they can't see a reason for it.

Mass Save and the Massachusetts User Defined Reference Home work together with gas and electric utilities providers to provide incentives for energy efficiency homes. Other Programs are available to Green Communities and towns which adopt the Stretch Energy code including; Residential High-Efficiency Heating Equipment Rebate Program, Major Renovations Program from Energy Star Homes, Tax Incentives Assistance Project.

Recommendations

We recommend Town Administrators to support the Stretch Energy Code option for the Town of Charlton. DOER supports the adoption of local stretch codes through continuation of upstream and/or downstream incentive structures, targeted at two years after local adoption, or until the next statewide code upgrade. Mass Save and the Massachusetts User Defined Reference Home work together with gas and electric utilities providers to provide incentives for energy efficiency homes. Other Programs are available to Green Communities and towns which adopt the Stretch Energy code including; Residential High-Efficiency Heating Equipment Rebate Program, Major Renovations Program from Energy Star Homes, Tax Incentives Assistance Project.

Town Administrators may choose to provide future alternatives incentives programs for residential homes, to assist in energy efficient measures from the grant provided through the Green

Communities Act. Such programs can include rebate for HERS raters and energy conservation improvements. Current pilot programs are place in other towns and may be implemented as a guide to Charlton (see Appendix E.)

Conclusion

Although we did not accomplish our ultimate goal of acquiring Green Communities status by the end of our Interactive Qualifying Project, our project team and the Town of Charlton have arrived to a much farther stage of completion than was previously thought possible. When commencing the project, Criterion 1 and Criterion 2 were essentially completed, only requiring a few administrative touches to be deemed finished. The most time-consuming tasks that our project team had to face were completing the last 3 Criteria: the Energy Reduction Plan; the Fuel-Efficient Vehicle Policy; and the Stretch Code.

A majority of the incomplete tasks in these 3 criteria were due to factors out of the project team's control. For data comparison and analysis tasks, the team required invoices of utility accounts. Unfortunately, due to a lack of administrative access to Town files, it was difficult receiving exactly what was required to satisfy a specific goal. This was especially true for the Energy Reduction Plan. For the Vehicle criterion, access to the list of cars municipally-owned is not a common request, and thus time and effort was required to research makes, models and fuel consumption for all different vehicle types owned by the town.

Another lagging factor in our overall goal completion was the rejection of the Stretch Code Appendix being added to the current Building Code. As discussed in the section labeled "Town Politics," there are a variety of disagreeing factors to undertaking "energy efficient" goals, especially those that have a price tag associated with it. The Stretch Code would initially cost the contractors and homeowners a few thousand dollars more, which is an unattractive factor during a tough period in the current American economy. Also, anything pertaining to regulations in a town such as Charlton – a town

that has a very traditional appearance, suggesting resistance to unnecessary mandates – might easily be rejected if it is not a necessity to the townspeople. The public, negative opinion to the Stretch Code was a huge impedance to the passing of the appendix and thus to the completion of the Criterion.

There are, however, a variety of benefits that have arisen due to the completion of this project. Besides the passing of the first two criteria, as previously stated, the Town of Charlton is more aware to the idea of what the Green Communities program entails. Previously started by the Town in 2010 and then dropped, the application process for the program is difficult to undertake without assistance from specific Green/Energy or Grant-Applying committees. Luckily, the decision of our project group to assist Charlton in this matter has been both a learning experience for us as well as for the town administration. This process is also difficult to complete without sufficient resources from the Town budget to provide funding for the tasks required. Energy audits and energy conservation measures, for example, are costly items that the Town might not necessarily have money for. Fortunately enough, the Department of Energy Resources does provide opportunities for towns applying to the grant program to communicate with energy-specific contractors. Also, the grant money can also be used towards the funding of big-ticket items such as boiler replacements, which will be especially helpful for Charlton and its Town Hall. Lastly, had our project team not brought up the idea of applying to the Green Communities program again, Charlton might not have considered the idea. Although there are 86 Green Communities to date, including the city of Worcester, many towns might not be aware of the opportunities provided by the government towards more sustainable measures. After these last 6 months, Charlton has become more aware of not only this program, but to rebate programs and incentives derived from other towns or provided by national or local companies, such as utility companies. Making the town more aware not only to the possibilities of the Green Communities Act, but to the improvement of its town through programs like it was, we believe, the largest positive outcome of our project experience.

Future Recommendations

The efforts of our Project Team were noted in the Charlton's Selectmen Meeting in March 6th 2012. We were applauded for the works we have done in effort to reorganize the Energy Reduction program to better utilize technologies and financial resources. The connection we had through one of the team members to Charlton Administrators were shown to be a great benefit in the progress of acquiring energy data, promoting sustainability avocation, and support for town's leaders. Having this connection and interaction with the Town is an important part of any Act especially one that deals with a controversial topic such as the Green Communities Act.

Future IQP project can include a continuation of our team's endeavor to make Charlton a Green Community. This can include following up with the Town making sure they achieve the Energy Reduction Plan of reducing energy by 20% by incorporating our suggested recommendations. An analysis can be done to see the actual benefit cost relationship from energy reduction equipment changes. Studies can be done in the energy reduction building code changes and how it has benefited or harmed the Town of Charlton. If the Town of Charlton does not pass the Green Community Act a study can be done in social policy to know if commercial, industrial, and residential market will take steps towards energy reduction and sustainability is done throughout Charlton without a plan in action.

All of such studies in the continuation of our research is important for other towns, states and governments who are interested in applying such programs where none have been planned. Massachusetts is one of the leading states in this movement to reduce energy consumption, promote renewable resource, and advocate sustainability. It is by the efforts of a combination of state and local municipalities, activists and private industry that such programs like the Green Community Act can foster. Having systematic plans such as the recommendations we have provided in this report can support others in advancing to into better communities and better societies

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WPI

Interactive Qualifying Project

Deborah Silva
Jennifer Henriquez
Joe Szafarowicz

Green Communities Act Action Plan

[Town of Charlton, Massachusetts]

WPI - Interactive Qualifying Project

The design of the Interactive Qualifying Project (IQP) is for WPI students to develop an understanding of how science and technology are embedded in the fabric of society. The IQP challenges students to address a problem that lies at the intersection of science or technology with society.

We are here because we have chosen to work on the Green Communities Act with the Town of Charlton in hopes of them becoming a Green Community. Charlton was perusing this designation and grant a few years ago but has since stopped due to lack of drive, manpower, and resources. Our purpose is to perform the necessary research and data organization to recuperate and reinvigorate ambition for this project and put Charlton on a viable path to achieve Green Community status.

This is a concise summary of the results of our group's research and findings concerning its work on preparing Charlton to qualify as a Green Community. Along with this report, there are recommendations to the town on how to proceed to actually achieve Green Community status.

The Green Communities Act

Criteria 1 – As-of-Right Siting

Background

To qualify as a green community, municipalities shall provide at least 5,000 ft^2 of zoning that allows the construction of renewable or alternative facilities. Examples of these facilities include solar panel manufacturers, wind turbines, and alternative energy research and development facilities.

Method for Meeting Criteria

To comply with this criterion, Charlton must provide the as-of-right siting for the types of facilitates mentioned above. This entails just having the necessary zoning in place that allows the construction of Alternative/Renewable energy facilities without having to use a special permit.

Along with the submittal of the application for Green Community Designation, Charlton will have to provide proper documentation for each Criterion. For Criteria 1, the town must provide a letter from the Town Counsel confirming that the town zoning districts do, in fact, satisfy the prescribed requirements for as-of-right zoning.

Progress Prior to Project

According to Charlton's zoning bylaw, there are many instances where required RE/AE facilities can exist. Research and Development uses are allowed without a special permit in the Business Enterprise Park (BEP) District and light manufacturing is allowed as-of-right in the Industrial General (IG) District. The Bylaw also allows wind energy conversion systems in all districts except the Village (V) District following a wind study and site plan review. Charlton is already compliant with this criterion.

Steps Completed by WPI Project Group

Since the requirements are already fulfilled by the town's zoning. Our group has prepared the information needed to submit to the DOER for review. There was a draft letter from Town Counsel concerning Criteria 1. We submitted this letter for review to a representative from the DOER. We received feedback that the letter was satisfactory. We have sent the letter to be finalized and put on the official Town Counsel letter head.

Recommendations

Make sure that the letter is written and signed by Town Counsel.

Criteria 2 – Expedited Permitting Process

Background

The municipality needs to ensure that there is an ***expedited application and permitting process*** for the as-of-right energy facilities mentioned in Criterion 1. Construction of AE/RE facilities within zoning districts must be issued within 1 year of the completed application.

Method for Meeting Criteria

To meet this criterion, the town has the option of adopting an expedited permitting process for the facilities mentioned above. One way to satisfy this is to adopt the Chapter 43D Expedited Permitting Preprogram or a similar mechanism to set timelines for permitting approval. The town could also prove that the town has nothing in place that would cause permitting approval to last more than a year.

Proper documentation must also be completed. A signed letter form Town Council will be needed affirming that the Town is complaint with Criteria2.

Progress Prior to Project

Discussions between the DOER, Town Council, the planning office, and the Energy Committee have resulted in the finding that Charlton is complaint with this criterion by the fact that there is nothing in place that would allow the application approval process to take more than a year. It is also not typical for an application to be delayed for over a year.

Steps Completed by WPI Project Group

Like with Criterion 1, our group has verified that the draft Town Council letter is satisfactory in completing the conditions set for this criteria. We have had dialog between Charlton's planning office and the DOER to make sure all requirement are being fulfilled.

Recommendations

Ensure that a final draft of the letter is written and signed by Town Counsel.

Criteria 3 – Energy Reduction Plan

1. Background

To satisfy Criterion 3, the town applying for Green Communities designation must create an energy use baseline inventory for municipally-owned buildings, vehicles, street and traffic lighting, and wastewater treatment plants and pumps. With this information, they must create and put into place an Energy Reduction Plan designed to reduce this baseline by 20 percent within 5 years of the selected baseline year. The energy use baseline inventory includes all utilities and facilities in aggregate for both natural fuel units and Million British Thermal Units (MBTU).

Of the tools suggested, provided and acceptable by the DOER, the WPI Project Team has selected to use MassEnergyInsight (MEI), an energy information system developed by the DOER in 2010, as the tool for organizing the energy use baseline inventory. With this software, information both manually added by the user as well as imported by the utility company is organized by department and facility. It is then processed by the software into a variety of charts and tables, demonstrating the energy usage across a number of fiscal years for individual facilities and for the town as a whole.

Once the inventory of energy usage for the town is created, the municipality must develop and implement an Energy Reduction Plan that will decrease energy consumption by 20 percent. This plan will include suggestions of energy conservation measures that the town may implement to obtain this percentage of savings, as well as detailing goals and appropriate courses of action to satisfy the requirement within the specified 5 year time frame.

2. Energy Use Baseline

The baseline year can be 2009, 2010, or 2011, and the Town can choose which data set to utilize. Furthermore, the Town can choose whether to report energy consumption based on the calendar year or fiscal year.

The deadline for achieving a 20 percent reduction in energy use is five years after the end of the baseline year.

Charlton will calculate savings for each fiscal year relative to the consumption data for fiscal year 2009 (the period July 1, 2008 through June 30, 2009). The Town will need to achieve a 20 percent reduction in energy use by June 30, 2014 to maintain their Green Communities status.

Going forward, the baseline energy consumption will not be adjusted for any of the following reasons:

- The construction, demolition, or transfer of ownership of Town buildings
- The acquisition or loss of Town vehicles

- The expansion of the wastewater collection system or the water supply system to service new customers

Exempt energy end uses include the following:

- Commercial space and vehicles that are leased by the Town
- Street light fixtures and signals that are owned by the state or electric company

3. Energy Reduction Strategies

- HVAC & Controls Improvements
  - **Tankless heaters? Estimated cost of ~$800**
  - **Indirect water heaters? Look for CAE of 0.85 or higher**
  - Variable frequency drives (VFDs) for air compressors - *http://www.ingersollrandproducts.com/IS/Product.aspx-am_en-33021*
  - **Compressed Air Efficiency:**
    - Comprehensive system evaluations
    - New compressors
    - Refrigerated dryers
    - Additional storage
    - Zero-Loss Condensate Drain Incentive Calculations
    - Enhanced controls
    - Piping improvements
    - Leak repair
- Lighting Improvements
  - Light-emitting diode (LED) Exit Signs – *Energy Audit*
  - Programmable Thermostats – *Suggestion from Energy Audit(s)*
  - Motion-sensor lighting (Occupancy sensors) – *Energy Audit*
  - **T5 or T8 fluorescent lighting systems** - *MassSave, National Grid Incentives*
  - **Electronic ballasts for lighting systems** - *MassSave, National Grid Incentives*
  - Induction-lighting systems: Suggested by EnergyStar @ "Where maintenance costs are high, including roadways and tunnels, parking garages, escalator wells, warehouses. and malls"… low lumen maintenance… last resort
- Building Envelope Improvements
  - **Insulation for the Police Department**
  - Vapor diffusion retarders – Moisture control (prevent leakage); ***Class III (Latex or enamel paint)*** permitted for vented cladding over OSB, plywood, fiberboard, or gypsum; R-5 minimum insulated sheathing for 2x4 wall; R-7.5 minimum insulated sheathing for 2x6 wall
- Vehicle Improvements
  - Anti-idling policy for standing vehicles
  - Idling permissions for police cruisers

- Energy conservation educational programs – *Energy Audit*

4. Method for Meeting Criterion

In order to satisfy this criterion, the Town of Charlton will have to complete an Energy Reduction Plan utilizing the resources provided in the above sections. To do so, the Town must fill the rest of the MassEnergyInsight database to the best of their ability. With this information, the Town will be able to accurately predict specific energy conservation measures to apply towards the requirement. Specific utilities to supply information for include gas delivery invoices from Peterson Oil Company. Lastly, the Town of Charlton's Board of Selectman must vote the completed Energy Reduction Plan into approval. If Charlton acquire Green Communities status after completing all 5 criterion, the Town will have to provide to the DOER an annual report, with guidance as to how to organize this report listed in the "Guidance for Criterion 3" on the Massachusetts DOER website. To gather the information, the Town will have to maintain the database with information from at least 5 years after the baseline year, demonstrating how they have been working towards the 20% energy reduction requirement.

Documentation

The Town of Charlton will provide DOER with the identified energy baseline reporting tool, the DOER's MassEnergyInsight tool, the results of the baseline inventory, and an approved Energy Reduction Plan that describes how the Town will reduce energy use by 20 percent from 5 years after the baseline year.

5. Progress Prior to Project

A Green Communites Action Plan was drafted in August 2010 by by Vanasse Hangen Brustlin, Inc. (VHB) and the Demand Management Institute. These two companies, particularly VHB, have a large focus on determining the energy efficiency of commercial buildings, which is an essential portion of Criterion 3.

Before working on drafting an Energy Reduction Plan, Charlton installed energy conservation measures (ECMs) that may and will be applied to the plan once the exact dates of installation and recorded energy/financial savings have been found. The windows in Charlton Town Hall have been replaced and the heating system has been recalibrated. The Charlton Public Library has been upgraded and expanded, and new or upgraded heating, cooling and lighting controls have been installed. We believe that these measures include ECMs such as controlled thermostats, multi-layered windows (for insulation purposes) and motion-sensor lighting. Until Charlton has all details required of the DOER for the Energy Reduction Plan for these specific measures, they cannot yet be placed into the ERP.

6. Steps Completed by WPI Project Team

- Identified the necessary information required to develop the energy baseline.
- Selected a baseline year (also determined in previous Action Plan by VHB)
- Compiled and organized data using MassEnergyInsight software using all energy data submitted for review.

- Compiled list of energy conservation measures the town may use in Energy Reduction Plan.
- Drafted an Energy Reduction Plan using provided energy invoices.

7. Action Items

CRITERIA #3 Action Items	Proposed Timeline
Create an energy inventory	✓
Update energy inventory	Within 4 months
Draft an Energy Reduction Plan	✓
Adopt the Energy Reduction Plan	Within 4 months
Compile the required documentation for Green Communities Application	Within 4 months

Criteria 4 – Procure Fuel Efficient Vehicles

Background

Criteria Four of the Green Communities Program states that communities must purchase only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and practicable. The purpose behind this criterion is to reduce carbon dioxide emissions by municipal vehicles. Many vehicles are exempt from this requirement, including: emergency vehicles, passenger vans, cargo vans, and heavy duty vehicles over 8,500 pounds.

Method for Meeting Criteria

The town has to adopt a Fuel Efficient Vehicle Policy. This policy, passed by the Board of Selectmen, must include language assuring the town follows the prescribed fuel efficiency standards per vehicle (see the attached proposed Energy Efficiency Policy for the Town of Charlton for the efficiencies 7for each specific vehicle class). The policy will also define the exemptions to the standards, the procurement guidelines, and a replacement policy.

Along with the policy, an inventory of the existing fleet must be included. This inventory will include information like year, make, model, estimated mpg, etc. This table would be used to determine which vehicles would be subject to the policy. The inventory must be updated yearly.

Like the other criteria, the town will also have to provide documentation about this criterion with the Green Communities application. Certification that the government has adopted the policy, a copy of the policy, and the vehicle inventory must be included with the application.

Progress Prior to Project

Charlton has taken no action prior to the involvement of the WPI project group in regards to Criteria 4. VHB has consulted the town about this criterion and provided information and a model policy, but no progress on the Fuel Efficient Vehicle Policy or the vehicle inventory has been achieved.

Steps Completed by WPI Project Team

The team has satisfied nearly all of the requirements for Criteria 4. A complete inventory (see attached) has been created. Included in this inventory include the department, year, make, model, year procured, VIN #, plate number, yearly mileage, fuel efficiency, annual fuel usage, and whether or not the

vehicle is exempt. A Fuel Efficient Vehicle Policy has also be drafted and proposed to the Charlton's Town Administrator and Board of Selectmen.

Challenged Faced

The challenging part of this criterion was obtaining the data to complete the inventory. Most of the information needed was scattered or incomplete. Setbacks include not being provided with enough information about certain vehicles (i.e. 4 cylinders vs. 6 cylinders, automatic vs. manual transmission, etc.).

Recommendations

We recommend the Board of Selectmen adopt the proposed Fuel Efficiency Vehicle Policy. Charlton should follow the fuel efficient vehicle replacement plan included in the policy; the town should replace the nonexempt vehicles that do not meet the minimum fuel efficiency requirements naturally as the current vehicles age and need to be replaced. The vehicle inventory should a good tool to track the mileage and fuel consumption for Charlton's fleet. This list should be kept current at least on a year-by-year basis.

Action Items

CRITERIA #4 Action Items	Proposed Timeline
Create Vehicle Inventory	February 2012
• **Determine the nonexempt vehicles**	
Adopt Fuel Efficient Vehicle Policy	March 2012
Submit requires documentation for Green Communities Designation Application including the following materials:	
• **Copy of the Fuel Efficient Vehicle Policy**	
• **Inventory of the existing fleet with plans for replacements with fuel efficient vehicles**	
• **Documentation that the general government has adopted policy**	

Criteria 5 – Stretch Code

1. Background

In July 2009, Massachusetts became the first state to adopt an above-code appendix to its state code – the 120 Stretch Energy Code. The 'Stretch' Code is an enhanced version of the 2009 IECC with greater emphasis on performance testing and prescriptive requirements. It was designed to be approximately 20 percent more efficient than the base energy code - the IECC 2009 for new construction, with less stringent requirements for residential renovations

The Code divides commercial buildings by size and type. New residential construction will require a Home Energy Rating System (HERS) score of 65 or less for homes 3,000 sq. ft. and larger and

70 or less for those smaller than 3,000 sq. ft., as well as compliance with the ENERGY STAR Qualified Homes Thermal Bypass Inspection. Additions must meet the same performance requirements, whereas renovations will require a less stringent HERS rating (80 or 85 for homes 2,000 sq. ft. and larger or smaller, respectively). Both can also comply with ENERGY STAR for Homes prescriptive requirements, plus meet or exceed 2009 IECC insulation requirements.

Buildings less than 5,000 sq. ft., "specialty buildings" less than 40,000 sq. ft. (supermarkets, warehouses, and laboratories), and renovations are exempt. Buildings larger than 100,000 sq. ft. and "specialty buildings" larger than 40,000 sq. ft. must exhibit a 20 percent reduction in energy use from ASHRAE 90.1-2007 using approved energy modeling. Buildings between 5,000 and 100,000 sq. ft. can meet the same performance requirements or a prescriptive code based on a codified version of New Building Institute Core Performance Guide, which includes more stringent building envelope and HVAC equipment requirements than the 2009 IECC and new requirements for commissioning, air barriers, and lighting controls.

2. Method for Meeting Criteria

A municipality must require all new residential construction over 3,000 square feet and all new commercial and industrial real estate construction to minimize the extent feasible, the life-cycle cost of the facility by utilizing energy efficiency.

The recommended way for cities and towns to meet this requirement is by adopting the Board of Building Regulations and Standards (BBRS) Stretch Code (780 CMR 115.AA), an appendix to the MA State Building Code. The purpose of this code is to provide a more energy efficient alternative to the base energy code for new and existing buildings.

3. Progress Prior to Project

The Town of Charlton does not currently meet this criterion. Upon request by the Green Committee in 2010 VHB held a technical presentation on the Stretch Energy Code to the Board of Selectmen, Green Committee members and the general public. In October 2011 WPI Project Group also held a presentation to the general public highlighting the specifications of the code and associated costs. This presentation was targeted towards new and renovations of residential buildings.

4. Steps completed by WPI Project Team

Held presentation of the Energy Stretch Code. Will provide a copy of the presentation to the Town for outreach purposes.

5. Challenges Faced

In Charlton we faced opposition from citizens and builders who believe that the initial costs inherent in the stretch code are too high to support its adoption. For many, it is difficult at first to see that the "life-cycle" energy savings will be greater than the initial cost. Many people don't see the value in adopting stricter building code when the general population is willing to buy homes as is. Towns have a hard time passing the stretch code because builders and code officials don't want to deal with extra hassle if they can't see a reason for it.

6. Recommendations

We recommend Town Administrators to support the Stretch Energy Code option for the Town of Charlton. DOER supports the adoption of local stretch codes through continuation of upstream and/or downstream incentive structures, targeted at two years after local adoption, or until the next statewide code upgrade.

Mass Save and the Massachusetts User Defined Reference Home work together with gas and electric utilities providers to provide incentives for energy efficiency homes. Other Programs are available to Green Communities and towns which adopt the Stretch Energy code including; Residential High-Efficiency Heating Equipment Rebate Program, Major Renovations Program from Energy Star Homes, Tax Incentives Assistance Project.

Town Administrators may choose to provide future alternatives incentives programs for residential homes, to assist in energy efficient measures from the grant provided through the Green Communities Act. Such programs can include rebate for HERS raters and energy conservation improvements. Current pilot programs are place in other towns and may be implemented as a guide to Charlton (see Appendix E)

7. Action Items

CRITERIA #5 Action Items	Proposed Timeline
Conduct public outreach on Stretch Energy Code.	April 2012
• **Host Stretch Code presentation for builders and interested residents**	
• **Advocate Stretch Code during Earth Day and Old Homes Day**	May 2012
Adopt the Stretch Energy Code at Town Meeting	May 2012
Submit requires documentation for Green Communities Designation Application including the following materials:	Within 4 months
• **Documentation of Town Meeting vote adoption MA Board of Building Regulations and Standards (BBRS) Energy Stretch Code**	
• **Electronic application via the web pdf versions**	

Summary of Action Items

Action Plan Checklist	Completion Date
CRITERIA #1	
Have adequate as-of-right zoning in place	✓
Town counsel letter certifying that the existing zoning complies with criteria	✓
CRITERIA #2	
Have expedited permitting process in place	✓
Town counsel letter affirming conformance of expedited permitting	✓
CRITERIA #3	
Create an energy inventory	✓
Draft an Energy Reduction Plan	March 2012
Adopt the Energy Reduction Plan	Within 4 months
CRITERIA #4	
Complete the vehicle inventory list to determine vehicles subject to criteria	March
Adopt a Fuel Efficient Vehicle Policy	Within 4 months
CRITERIA #5	
Conduct public outreach on Stretch Energy Code	April
Adopt the Stretch Energy Code at Town Meeting	May
Submit required documentation for Green Communities Application	Within 4 months

Appendix A. Criteria 1&2

COSGROVE & BLATT
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March 3, 2012

Robin L. Craver, Town Administrator
Town of Charlton
37 Main Street
Charlton, MA 01507

RE: Opinion of Counsel-Application for Green Community Status, As-of-right Zoning

Dear Ms. Craver:

You have requested an opinion in conjunction with the Town's application to the Department of Energy Resources (DOER) for Charlton's designation as a "Green Community". Under the requirements, the Town must verify that its bylaws provide for "as-of-right" siting of renewable or alternative energy facilities for energy generation, renewable or alternative energy research and development ("R&D") or renewable or alternative energy manufacturing.

An opinion of Town Counsel analyzing the Zoning Bylaw is required along with an analysis of the available land in the appropriate districts and whether there is a realistic opportunity for the development of these facilities. I have worked with, and rely for bylaw review and subsidiary facts upon, Charlton Town Planner Alan I. Gordon, who is most intimately familiar with the Charlton Zoning Bylaw and the Town's land use and planning therefor, and with whom as Town Counsel I have worked regularly for 10 years since his appointment as Town Planner, in obtaining this information and in preparing and providing this opinion, and have enclosed certain documents that should accompany this letter with the application. They include the Town's Zoning Map, the Table of Principal Use Regulations from the Zoning Bylaw, which is Section 3.2, and certain sections of the Zoning Bylaw referenced herein.

Zoning Bylaw

In my opinion, the Charlton Zoning Bylaw ("Bylaw") provides for "As-of-right" siting for renewable or alternative energy facilities for energy generation, renewable or alternative energy research and development ("R&D) or renewable or alternative energy manufacturing in almost all zoning districts, as discussed below. In formulating this opinion, I have assumed and understand that an "As-of-Right" use requires no variance, special permit or other zoning permit from a Town Board or Officer in the district where the use is permitted. Charlton's Bylaw does require Site Plan Review unrelated to a special permit requirement (see attached bylaw Section 7.1.4-Site Plan Review and Approval) for the aforementioned alternative energy land uses and activities. However, absent problems so intractable as to admit of no reasonable solution, such site plan review is a non-discretionary procedure used to ensure compliance with the

Bylaw, safety and aesthetic concerns as to a specific site. The site plan review provisions of the Bylaw do not determine use and specifically conform to the requirements contained in the DOER Guidelines for the application acknowledging non-discretionary site plan review that allows "As-of-right" projects provided they are consistent with the Bylaw and with state and federal law. Accordingly, it is my opinion that the Charlton Bylaw provides for "As-of-right" zoning allowing the establishment and construction of the aforementioned energy facilities for energy generation, renewable or alternative energy research and development ("R&D") or renewable or alternative energy manufacturing.

Specifically, without limitation, renewable or alternative energy facilities including wind energy conversion systems and large-scale ground-mounted solar photovoltaic installation are allowed as-of-right in all Business Enterprise Park (BEP), Industrial-General (IG), Community Business (CB), Neighborhood Business (NB), Residential-Small Enterprise (R-SE), Low Density Residential (R-40) and Agricultural (A) Districts. Research and development is allowed as-of-right in all zoning districts with the exception of the Low Density Residential (R-40) and Agricultural (A) Districts.

There are no specific limitations to the approval of these uses as-of-right, with the exception of any land which is within one of the Town's Flood Plain Overlay Districts (bylaw attached). Certain uses which may have a detrimental impact on the Town's Flood Plain areas are limited in these districts in order to minimize flood damage and to minimize any impediment to the natural flow of flood waters. Notwithstanding the foregoing, there exist ample, unrestricted opportunities in the various Town Zoning Districts which can provide facilities for both manufacturing and research and development of renewable or alternative materials that are clearly allowed as-of-right. Therefore, it is my opinion, based on the Town Planner's review and information and my own understanding of applicable law, that Charlton's zoning qualifies pursuant to DOER's application Guidelines under the first criteria.

Zoning Map/Districts

The Town's zoning districts are set forth on the enclosed Official Zoning Map. They contain various lot size, frontage, setback and building coverage requirements in the districts under discussion (see attached). All Industrial uses and Research and Development uses have the same parking requirements of one (1) space for each five hundred (500) square feet floor area in building use. All Charlton zoning districts have a thirty-six (36) foot maximum height restriction, with the exception of standard industry heights allowed for wireless telecommunications facilities and wind energy conversion systems.

Below is a description of the zoning districts which could allow renewable or alternative energy facilities, including an analysis of the potential acreage available for such uses in the predominantly non-residential land use zoning districts:

Business Enterprise Park (BEP)

344 Acres.

Industrial-General (I-G)

700 Acres.

Community-Business-(CB)

315 Acres.

Neighborhood Business (NB)

91 acres

Residential Small Enterprise (R-SE)

240 acres

In conclusion, it is my opinion, based on the Town Planner's review and information and my own understanding of applicable law, that the Charlton Zoning Bylaw provides for as-of-right development of manufacturing and research and development facilities for renewable or alternative energy, and this includes all of the qualifying activities identified by DOER. Furthermore, based on the information provided by the Planner, there is ample land for development in the BEP, I-G, CB, NB, R-SE, R-40 and A zoning districts that provide realistic opportunities for construction of at least 50,000 sq. ft. of floor area, as well as redevelopment if private companies purchased properties in these districts.

Sincerely,

James F. Cosgrove, Town Counsel

cc: Alan I. Gordon, Town Planner

CharltonGreenCommunitiesActionPlanZoningOpinionTOWNCOUNSELOPINIONREASOFRIGHTZONINGJFCFINAL3-3-12

Appendix A. Criteria 1&2

COSGROVE & BLATT
COUNSELORS AT LAW
A PROFESSIONAL ASSOCIATION OF INDIVIDUAL
ATTORNEYS AND NOT A PARTNERSHIP*
SLATER BUILDING - SUITE 730
390 MAIN STREET
WORCESTER, MASSACHUSETTS 01608-2582

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PATTI GEDDES
Legal Assistant
pgeddes.law@verizon.net

TELEPHONE
(508) 757-4554
FAX NO.
(508) 752-3420

March 3, 2012

Robin L. Craver, Town Administrator
Town of Charlton
37 Main Street
Charlton, MA 01507

RE: Opinion of Counsel-Application for Green Community Status, Expedited Permitting

Dear Ms. Craver:

You have requested an opinion in conjunction with the Town's application to the Department of Energy Resources (DOER) for Charlton's designation as a "Green Community". Under the requirements, the Town must verify that its bylaws provide for "permitting of renewable or alternative energy facilities" within one year of the date of application for any as-of-right facility.

I have worked with, and rely for bylaw review and subsidiary facts upon, Charlton Town Planner Alan I. Gordon, who is most intimately familiar with the Charlton Zoning Bylaw and the Town's land use and planning therefor, and with whom as Town Counsel I have worked regularly for 10 years since his appointment as Town Planner, in obtaining this information and in preparing and providing this opinion.

Pursuant to Sections 3.2 (Use Regulations) and 7.1.4 (Site Plan Review and Approval) of the Town of Charlton's Zoning Bylaw ("Bylaw"), most municipal, institutional, exempt, commercial or industrial uses are required to undergo Site Plan Review by the Planning Board. As set forth in my prior opinion of the same date, the Town provides for renewable or alternative energy uses in several districts as a matter of right (i.e., allowed use).

The Town of Charlton Zoning Bylaw ("Bylaw") does not require the issuance of a special permit for as-of-right uses but does utilize the time standards in Section 7.2.7 (Public Hearing) of the Bylaw relating to special permits. Section 7.2.7 provides that a public hearing must be held within sixty-five (65) days of the filing. In accordance with M.G.L. Chapter 40A, Section 9, a decision must be rendered within ninety (90) days from the date of the public hearing. Failure to take final action within the ninety (90) day period is deemed to be a grant. This time frame is clearly within DOER's guidelines of one year.

Therefore it is my opinion that nothing within the Town's Zoning Bylaw or other permitting

requirement precludes issuance of a decision for an as-of-right renewable or alternative energy facility within one year.

Sincerely,

James F. Cosgrove, Town Counsel

cc: Alan I. Gordon, Town Planner

CharltonGreenCommunitiesActionPlanZoningOpinionTOWNCOUNSELOPINIONREEXPEDITEDPERMITTINGJFCFINAL3-3-12

Appendix B. Criteria 3

Rebates 2012

GasNetworks®
Energy saving solutions from your local gas company

High-Efficiency Heating & Hot Water Equipment Rebates for Residential Customers

- Berkshire Gas
- Blackstone Gas
- Columbia Gas of Massachusetts
- National Grid (MA only)
- New England Gas
- NSTAR Gas
- Unitil (MA and NH)

Appendix B. Criteria 3

Rebate Program High-Efficiency Equipment

How to Participate

1. Have a licensed heating contractor or plumber install eligible equipment.

2. Mail the following items:

- Completed Application
- Copy of a dated work order / invoice / receipt that identifies:
  - Equipment or measure installed
  - Contractor License Number
  - Manufacturer
  - AFUE/EF/Thermal Efficiency Rating
  - Contractor
  - Contractor Address
  - Model Number
  - Installation Costs

3. Mail the signed rebate form with attached receipt to:

GasNetworks
High Efficiency Heating Equipment Rebate
Offer No. H943801
P.O. Box 130013
El Paso, TX 88513-0013

Make sure to make a copy of the rebate form for your records.

Program Guidelines

- You must be a customer of a GasNetworks member utility: Berkshire Gas, Blackstone Gas, Columbia Gas of Massachusetts, National Grid (MA only), New England Gas, NSTAR Gas, Unitil (MA) or Unitil (NH).
- *National Grid requires rebate money to be reserved prior to installation.* If you are a National Grid customer, please go to **www.smartenergy-zone.com/nationalgrid** to make your reservation. When you have made your reservation, please print and submit the rebate application available at that site. ***National Grid customers will not be eligible for any rebate money without a reservation.***
- All installations of high-efficiency heating systems (furnaces and boilers) and/or water heating systems (indirect, storage, or on-demand tankless) must be installed by a licensed contractor and/or plumber. All installations must conform to all applicable codes and be installed in accordance with all rebate Program Guidelines.
- All installations are subject to verification that the equipment has been installed and is operational.
- Please read all Terms and Conditions on the reverse of the rebate application.
- Rebate offers subject to change without notice. Some restrictions may apply.
- All eligible equipment meets or exceeds ENERGY STAR® specification requirements. To find ENERGY STAR® qualified products, visit the Products page at www.energystar.gov

Additional Rebate Offers
For more information about the wide array of GasNetworks Energy Savings Rebates and Programs, log on to **gasnetworks.com** or call **1-800-232-0672**

Eligible Equipment

HIGH-EFFICIENCY NATURAL GAS WARM AIR FURNACE

AFUE Rating 96% or greater w/Electronic Commutated Motor or listed on www.gasnetworks.com as electrically efficient **$800**

AFUE Rating 95% or greater w/Electric Commutated Motor or listed on www.gasnetworks.com as electrically efficient **$500**

These rebates are in partnership with National Grid (MA only), NSTAR Electric, Western Massachusetts Electric Company, Cape Light Compact, Unitil.

HIGH-EFFICIENCY NATURAL GAS BOILER

Hot Water Boiler - AFUE Rating 96% or greater **$1,500**

Hot Water Boiler - AFUE Rating 90% or greater **$1,000**

COMBINED HIGH-EFFICIENCY BOILER AND WATER HEATING UNIT

Must be considered one unit by manufacturer

Condensing Boiler with On-Demand Hot Water Minimum AFUE Rating of 90% **$1,200**

HIGH-EFFICIENCY INDIRECT WATER HEATER

Attached to a natural gas boiler **$400**

CONDENSING GAS WATER HEATER

95% Thermal Efficiency or greater..... **$500**

HIGH-EFFICIENCY ON-DEMAND, TANKLESS WATER HEATER

.95 Energy Factor or greater with Electronic Ignition **$800**

.82 Energy Factor or greater with Electronic Ignition **$500**

HIGH-EFFICIENCY STORAGE WATER HEATER

.67 Energy Factor ENERGY STAR® qualified **$100**

HEAT RECOVERY VENTILATOR

A factory-assembled, packaged unit including fans or blowers that transfer heat between two isolated airstreams. Must be a natural gas heating customer; excludes portable units. **$500**

AFTER-MARKET OUTDOOR BOILER RESET CONTROLS

Must be connected to a natural gas boiler **$225**

7-DAY PROGRAMMABLE THERMOSTAT

There is a two-rebate limit per account, and the rebate cannot exceed the purchase price of the thermostat..... **$25**

Please include a dated receipt and original UPC code from the package.

Appendix B. Criteria 3

Rebate Form

Check List ✔

- ❑ Complete all questions, read all terms and conditions, and sign the application.
- ❑ Make sure utility Gas & Electric account numbers are listed below as required.
- ❑ Make a copy of the front and back of this application for your records.
- ❑ Attach copies of a dated invoice or receipt which specifies the equipment installed, installation cost, manufacturer, model number, and AFUE (for heating equipment) Thermal Efficiency or Energy Factor (for hot water heating equipment) with equipment make, model and size documenting the installation of the equipment and includes the contractor's name, license number, address and phone number.
- ❑ Complete, signed application and all corresponding documentation must be mailed within 60 days from installation date to:

  GasNetworks
  High Efficiency Heating Equipment Rebate
  Offer # H943801
  PO Box 130013, El Paso, TX 88513-0013

Please allow 4-6 weeks for your rebate request to be processed.

Be sure to attach copies of all your receipts and mail them with this signed application to: GasNetworks High Efficiency Heating Equipment Rebate (MA) Offer # H943801; PO Box 130013, El Paso, TX 88513-0013

I hereby request a rebate for the listed work. Attached are copies of all receipts. I have read and agree to the Terms and Conditions on the reverse side of this form. I certify that a licensed contractor has installed the listed high-efficiency natural gas heating and/or water heating system in accordance with Program Guidelines and Terms and Conditions as described on this form.

SIGNATURE _____ DATE _____

Some restrictions may apply. Rebates offers are subject to change without notice.

• *National Grid requires rebate money to be reserved prior to installation.* If you are a National Grid customer, please go to **www.smartenergy-zone.com/nationalgrid** to make your reservation. When you have made your reservation, please print and submit the rebate application available at that site. ***National Grid customers will not be eligible for any rebate money without a reservation.***

PLEASE CHECK YOUR GAS UTILITY:

❑ BERKSHIRE GAS ❑ BLACKSTONE GAS ❑ NSTAR GAS ❑ COLUMBIA GAS OF MASSACHUSETTS
❑ NEW ENGLAND GAS ❑ UNITIL (MA) ❑ UNITIL (NH) ❑ NATIONAL GRID *(MA ONLY)*

WEB SUBMISSION ID _____ *National Grid Gas Customers Only.*

GAS UTILITY ACCOUNT NUMBER: _____ *(where equipment was installed)*

❑ OWNER ❑ TENANT

ACCOUNT HOLDER'S NAME _____ ( ) TELEPHONE _____

INSTALLED STREET ADDRESS _____ CITY _____ STATE _____ ZIP _____

MAILING STREET ADDRESS *(IF DIFFERENT)* _____ CITY _____ STATE _____ ZIP _____

NAME OF PERSON TO WHOM REBATE SHOULD BE MADE PAYABLE _____ ( ) TELEPHONE _____ EMAIL ADDRESS _____

INSTALLED BY *(CONTRACTOR NAME)* _____ LICENSE # _____

CONTRACTOR STREET ADDRESS _____ CITY _____ STATE _____ ZIP _____

HIGH-EFFICIENCY HEATING EQUIPMENT REBATE

WHAT DID YOU INSTALL?

❑ NATURAL GAS FURNACE W/ECM ≥ 96% AFUE - $800
❑ NATURAL GAS FURNACE W/ECM ≥ 95% AFUE - $500
❑ NATURAL GAS HOT WATER BOILER ≥ 96% AFUE - $1,500
❑ NATURAL GAS HOT WATER BOILER ≥ 90% AFUE - $1,000
❑ CONDENSING BOILER W/ON-DEMAND DHW ≥ 90% AFUE - $1,200

ELECTRIC UTILITY NAME _____ ELECTRIC UTILITY ACCOUNT # _____

MANUFACTURER _____ MODEL # _____ AFUE _____ DATE INSTALLED _____ TOTAL COST _____

REBATE AMOUNT $ _____ REPLACED/OLD UNIT INFORMATION: ❑ GAS ❑ OIL ❑ ELECTRIC ❑ PROPANE ❑ NEW CONSTRUCTION

HIGH-EFFICIENCY NATURAL GAS WATER HEATER REBATE

WHAT DID YOU INSTALL?

❑ ON-DEMAND TANKLESS WATER HEATER ≥ .95 ENERGY FACTOR W/ELECTRONIC IGNITION - $800
❑ ON-DEMAND TANKLESS WATER HEATER ≥ .82 ENERGY FACTOR W/ELECTRONIC IGNITION - $500
❑ ENERGY STAR® QUALIFIED STORAGE WATER HEATER ≥ .67 ENERGY FACTOR - $100
❑ CONDENSING GAS WATER HEATER ≥ 95% THERMAL EFFICIENCY OR GREATER - $500
❑ INDIRECT WATER HEATER - $400

MANUFACTURER _____ MODEL # _____ ENERGY FACTOR/THERMAL EFF. _____ DATE INSTALLED _____ TOTAL COST _____

REBATE AMOUNT $ _____ REPLACED/OLD UNIT INFORMATION: ❑ GAS ❑ OIL ❑ ELECTRIC ❑ PROPANE ❑ NEW CONSTRUCTION

Please see additional rebate listing for completion on reverse side. →

Appendix B. Criteria 3

HEATING CONTROLS

WHAT DID YOU INSTALL? ❑ AFTER-MARKET OUTDOOR BOILER RESET CONTROLS - $225

❑ 7-DAY PROGRAMMABLE THERMOSTAT REBATE - $25 *(LIMIT 2 PER ACCOUNT)*

(rebate not to exceed the purchase price) *Please include a dated receipt and original UPC code from the package.*

MANUFACTURER	MODEL #	QUANTITY	TOTAL COST	REBATE AMOUNT $

HEAT RECOVERY VENTILATOR - $500

MANUFACTURER	MODEL #	QUANTITY	TOTAL COST	REBATE AMOUNT $

TERMS AND CONDITIONS

1. **Customer Eligibility**
   You must be a residential heating customer of Berkshire Gas, Blackstone Gas, Columbia Gas of Massachusetts, National Grid (MA only), New England Gas, NSTAR Gas, Unitil (MA) or Unitil (NH) to qualify. Only equipment purchases and installations made between January 1, 2012 - and December 31, 2012 are eligible for rebate. Equipment must be installed by a licensed heating or plumbing contractor at the customer's address listed on the GasNetworks Rebate Form. ***Rebate form must be filled out completely, signed and accompanied by dated receipts, and received by GasNetworks within 60 days from installation date.***
2. **Installation Verification**
   Prior to honoring any rebate, GasNetworks reserves the right to conduct an on-site verification that the equipment has been installed according to Program Guidelines and is in operation. This site visit, and all aspects related to this site visit, are conducted solely for such purpose. The site visit is not a safety review, nor is it intended for any other purpose.
3. **Warranties**
   GasNetworks and the Rebate Administrator do not endorse, guarantee or warrant any particular contractor, manufacturer or installation.
4. **Changes to High-Efficiency Equipment Rebate Program**
   Program is subject to change without prior notice, and rebate offers may increase or decrease at any time.
5. **Tax Liability**
   Participants of the program may be subject to tax liability for the value of goods and services received through the program pursuant to state or federal income tax codes.
6. **No Tax Liability to GasNetworks and Rebate Administrator**
   GasNetworks and the Rebate Administrator are not responsible for any tax liability which may be imposed as a result of receipt of the rebates provided by the natural gas utility to the customer.
7. **Liability & Release**
   As part of the consideration for participating in the program, participant hereby releases and shall indemnify, hold harmless and defend GasNetworks, its member utilities, and the Rebate Administrator from any and all claims, losses, harm, costs, liabilities, damages and expenses (including attorneys' fees) of any nature whatsoever arising directly or indirectly out of or in connection with the installation of high-efficiency equipment at the premises or any material and labor required for such installation.
8. **Changes to Rebate Amounts**
   GasNetworks will provide rebates for approved equipment up to the rebate amount indicated in this application. ***Projects greater than ten (10) units require pre-approval from GasNetworks for rebate funds to be reserved.*** Pre-approval can be obtained by contacting gasnetworks@smartenergy-zone.com

For questions regarding this program, please call **1-800-232-0672** or email **gasnetworks@smartenergy-zone.com**
For more forms and info on other rebate programs, visit **gasnetworks.com**

FREQUENTLY ASKED QUESTIONS

1. **What is GasNetworks?** GasNetworks is a collaborative consisting of local gas companies whose mission is to work with governmental agencies and affiliates to promote energy-efficient technologies, create common efficiency programs, educate consumers, and promote contractor training and awareness of ever-changing natural gas technologies.
2. **What is the purpose of the GasNetworks Rebate Program?** The purpose of the program is to encourage customers to purchase and install energy-efficient equipment. Your gas company provides a rebate to cover a portion of the additional cost for purchasing the energy-efficient equipment versus standard efficiency equipment.
3. **How can I recognize this equipment?** A customer or contractor who is uncertain about whether equipment meets the efficiency criteria should check with a local distributor or manufacturer. For questions regarding eligible equipment, please call the GasNetworks Rebate Administrator at 1-800-232-0672 or contact your heating or plumbing contractor. Qualifying equipment meets or exceeds ENERGY STAR® specifications. ENERGY STAR® products are verified by third-party certification organizations to assure that products will perform as marketed. For a list of ENERGY STAR® qualified heating products, visit the Products page at www.energystar.gov
4. **Where can I find a contractor to install the equipment?** Refer to the ENERGY STAR® website at www.energystar.gov for tips on how to find the right contractor, and check the local Yellow Pages for a complete list of licensed plumbers or heating contractors that specialize in gas heating and water heating systems.
5. **When will I receive my rebate?** Pending approval, we will process and mail the rebate within 4 to 6 weeks of receipt of the properly completed and signed application.

To check on status of your rebate visit www.smartenergy-zone.com/gasnetworks

GasNetworks®
Energy saving solutions from your local gas company

GasNetworks® is a proud partner of MASS SAVE

mass save®
Savings through energy efficiency

Rebates 2012

High-Efficiency Commercial Natural Gas Equipment Rebates

Save energy with high-efficiency equipment. Rebates are provided to reduce the cost difference between standard efficiency and high-efficiency equipment.

- High-Efficiency Heating Equipment
- High-Efficiency Water Heating Equipment
- After Market Boiler Reset Controls
- Programmable Thermostats
- Steam Traps

mass save®
Savings through energy efficiency

GAS PROGRAM ADMINISTRATORS

Columbia Gas of Massachusetts
A NiSource Company
Columbia Gas of Massachusetts
Tel: 1-800-232-0120
www.ColumbiaGasMA.com
efficiency@columbiagasma.com

Berkshire Gas
A UIL HOLDINGS COMPANY
Berkshire Gas
Tel: 1-877-883-1759
www.BerkshireGas.com
efficiency@berkshireGas.com

New England Gas Company
New England Gas Company
Tel: 1-508-324-7811
www.NEGasCo.com
efficiency@sug.com

nationalgrid
National Grid
Tel: 1-800-843-3636
www.powerofaction.com/efficiency
efficiency@us.ngrid.com

NSTAR
NSTAR
Tel: 1-781-441-8592
www.nstar.com
efficiency@nstar.com

Unitil
Unitil
Tel: 1-888-301-7700
www.unitil.com
efficiency@unitil.com

ELECTRIC PROGRAM ADMINISTRATORS

Cape Light Compact
Cape Light Compact
P.O. Box 427 SCH.
Barnstable, MA 02630
Tel: 1-800-797-6699
www.Capelightcompact.org
efficiency@capelightcompact.org

nationalgrid
National Grid
40 Sylvan Road
Waltham, MA 02451-1120
Tel: 1-800-787-1706
www.powerofaction.com/efficiency
efficiency@us.ngrid.com

NSTAR
NSTAR
One NSTAR Way, SW 360
Westwood, MA 02090
Tel: 1-781-441-8592
www.nstar.com
efficiency@nstar.com

Unitil
Unitil
285 John Fitch Highway
Fitchburg, MA 01420
Tel: 1-888-301-7700
www.unitil
efficiency@unitil.com

Western Massachusetts Electric
The Northeast Utilities System
Western Massachusetts Electric Company
P.O. Box 2010
West Springfield, MA 01090-2010
Tel: 1-800-835-2707
www.wmeco.com
efficiency@wmeco.com

Appendix B. Criteria 3

High-Efficiency Commercial Natural Gas Equipment Rebates

INSTRUCTIONS

Is your project eligible? Equipment shall be new and shall be installed in a commercial, industrial, institutional, educational, multifamily, or municipal facility within a Program Administrator's (PA's) service territory. Projects that are expected to exceed 5 units and/or $25,000 in rebates will require pre-approval.

Is the equipment you intend to buy eligible? Product types listed on this form are eligible for prescriptive rebates. However, additional measures not listed here may be eligible for custom rebates.

Pre-Approval Requirements (if applicable): *Applicable if projects are expected to exceed 5 units and/or $25,000 in rebates:*

1. Contact your Program Administrator before purchasing and installing the equipment.
2. If the Energy Efficient Measure (EEM) qualifies for a rebate, a "pre-approved rebate letter" will be issued.

How to Get Your Rebate:

1. Purchase and install the qualifying equipment
2. Mail the following items:
   - Completed and Signed Application
   - A copy of the pre-approval rebate letter (if applicable)
   - Manufacturer's technical specification sheets ("cut sheets") for each type of eligible equipment purchased
   - Copy of a dated work order / invoice / receipt that identifies:
     - Equipment or measure installed
     - Contractor
     - Contractor License Number
     - Contractor Address
     - Manufacturer
     - Model Number
     - AFUE/EF/Thermal Efficiency Rating
     - Installation Costs
3. Mail the signed rebate form with attached receipts to: **Commercial High-Efficiency Gas Equipment Rebate**
   Offer#: H343805
   P.O. Box 130013
   El Paso, TX 88513-0013

Qualifying Equipment
a list of qualifying heating equipment is available at www.ahridirectory.org

Program Details: This rebate program applies to equipment purchased and installed between January 1, 2012 and December 31, 2012. Applications must be postmarked within 60 days from installation date.

2012 High-Efficiency Natural Gas Equipment Rebates

HEATING EQUIPMENT

FURNACE	RATING	REBATE
Up to 150 MBH	95% AFUE* or greater & ECM motor	$500
Up to 150 MBH	96% AFUE* or greater & ECM motor	$800

CONDENSED UNIT HEATERS	RATING	REBATE
Up to 300 MBH	90% Thermal Efficiency or greater	$750

INFRARED HEATERS	RATING	REBATE
All Sizes	Low Intensity	$750

CONDENSING BOILERS	RATING	REBATE
Up to 300 MBH	90% AFUE* or greater	$1,000
Up to 300 MBH	96% AFUE* or greater	$1,500
301 to 499 MBH	90% Thermal Efficiency	$2,000
500 to 999 MBH	90% Thermal Efficiency	$4,000
1000 to 1700 MBH	90% Thermal Efficiency	$7,500
1701 to 2000 MBH	90% Thermal Efficiency	$10,000

CONTROLS EQUIPMENT

AFTER MARKET BOILER RESET CONTROLS	$225/ea.
STEAM TRAPS**	$25/ea.
7-DAY PROGRAMMABLE THERMOSTATS	$25/ea.

WATER HEATING EQUIPMENT

ON DEMAND TANKLESS	RATING	REBATE
with Electronic Ignition	Energy Factor of .82 or greater	$500
	Energy Factor of .95 or greater	$800

HIGH-EFFICIENCY INDIRECT WATER HEATER	REBATE
	$400

CONDENSING STAND ALONE	RATING	REBATE
75 to 300 MBH	95% Thermal Efficiency or greater	$500

ENERGY STAR®	RATING	REBATE
Freestanding	Energy Factor of .67 or greater	$100

COMBINED HIGH-EFFICIENCY BOILER AND WATER HEATING UNIT

Condensing Boiler with On-Demand Hot Water	REBATE
Minimum AFUE Rating of 90%	$1,200

Must be considered one unit by manufacturer.

NOTES

* AFUE = Annual Fuel Utilization Efficiency
All MBH levels are based on the unit's input.
** Greater than 10 Steam Traps requires pre-approval.
Note: All equipment must meet program guidelines. All rebates are given on a per-unit basis.
Some restrictions may apply. Rebate offers are subject to change without notice.

To check on the status of your rebate please visit www.smartenergy-zone.com/masssave

Appendix B. Criteria 3

Heating, Water Heating & Controls Rebate Form

mass save®
Savings through energy efficiency

Offer #: H343805
P.O. Box 130013
El Paso, TX 88513-0013
1-877-883-1759

CUSTOMER INFORMATION

COMPANY NAME

( ) TELEPHONE

INSTALLATION SITE

UTILITY REPRESENTATIVE

CONTACT PERSON

SQ. FT. *(COVERED BY THIS APPLICATION)*

EMAIL ADDRESS

TOTAL FACILITY SQ. FT.

STREET ADDRESS

CITY STATE ZIP

PAYEE NAME:

❑ Customer ❑ Vendor/Installer

CUSTOMER TAX ID #

COMPANY TYPE: ❑ Incorporated ❑ Not Incorporated ❑ Exempt

MAILING ADDRESS *(IF DIFFERENT)*

CITY STATE ZIP

GAS CO. NAME

GAS ACCT. # *(OR COPY OF GAS BILL)*

ELECTRIC CO. NAME

ELECTRIC ACCT. # *(OR COPY OF ELECTRIC BILL)*

BUILDING TYPE *(SELECT ONE)*

❑ Assembly	❑ Fast Food	❑ Hotel	❑ Multi Story Retail	❑ Religious	❑ Small Retail
❑ Automobile	❑ Full Service Restaurant	❑ Large Refrigerated Space	❑ Multifamily High Rise	❑ K-12 Schools	❑ University
❑ Big Box	❑ Grocery	❑ Large Office	❑ Multifamily Low Rise	❑ Small Office	❑ Warehouse
❑ Community College	❑ Heavy Industrial	❑ Light Industrial	❑ Other _____		
❑ Dormitory	❑ Hospital	❑ Motel			

PROJECT TYPE *(SELECT ONE)*

❑ Change in the use or Function of the Building Space	❑ Expansion of an Existing Building	❑ New Building
❑ New Equipment for New Process or Expanded Operation	❑ Renovation of Existing Equipment	❑ New Controls for Improved Operations

VENDOR INFORMATION

VENDOR/INSTALLER

STREET ADDRESS

CONTACT PERSON

CITY STATE ZIP

PHONE NUMBER

EMAIL ADDRESS

LICENSE TYPE *(REQUIRED)*

LICENSE NUMBER *(REQUIRED)*

CUSTOMER ACKNOWLEDGEMENT

I hereby request a rebate for the equipment listed. Attached are copies of all receipts. I have read and agree to the Terms and Conditions on the reverse of this form. I certify that a licensed contractor has installed the listed equipment (when applicable) in accordance with Program Guidelines and Terms and Conditions. I certify that I have seen the Energy Efficient Measures that have been installed and I am satisfied with their installation.

AUTHORIZED SIGNATURE

DATE

NAME *(PRINT)*

The Customer must send a complete, signed rebate form along with original dated receipts and any other required information or documentation to the Program Administrator within sixty (60) days from installation date.

Appendix B. Criteria 3

MEASURE INFORMATION - HEATING EQUIPMENT

TYPE OF EQUIPMENT	MANUFACTURER	MODEL NUMBER	RATING (THERMAL EFFICIENCY, AFUE OR ENERGY FACTOR)	INPUT SIZE	INSTALLED COST	INSTALLED DATE	*QTY INSTALLED	*REBATE AMOUNT
ECM Furnace								
Condensing Unit Heater								
Infrared Heater								
Condensing Boiler								
On-Demand Tankless Water Heater								
Indirect Water Heater								
Condensing Stand Alone Water Heater								
Integrated Condensing Boiler/ Water Heater								
ENERGY STAR® Storage Water Heater								

PROJECTS THAT ARE EXPECTED TO EXCEED 5 UNITS AND / OR $25,000 IN REBATES WILL REQUIRE PRE-APPROVAL.

ANTICIPATED TOTAL REBATE: $

MEASURE INFORMATION - CONTROLS

TYPE OF EQUIPMENT	MANUFACTURER	MODEL NUMBER	SIZE OF UNIT CONTROLLED (BTU)	INSTALLED COST	INSTALLED DATE	QTY INSTALLED	REBATE AMOUNT
After Market Boiler Reset Controls							
Steam Traps							

ANTICIPATED TOTAL REBATE: $

FOR THERMOSTAT REBATES, PLEASE ANSWER THE FOLLOWING QUESTIONS:

THERMOSTAT REBATES

TYPE OF EQUIPMENT INSTALLED	MANUFACTURER	MODEL NUMBER	TYPE OF UNIT BEING CONTROLLED	WHAT IS THE THERMOSTAT REPLACING	DOES THERMOSTAT CONTROL AIR CONDITIONING?	INSTALLED COST	INSTALLED DATE	QTY INSTALLED	REBATE AMOUNT
7-Day Programmable Thermostat			❑ Furnace ❑ Boiler ❑ Rooftop Unit, ❑ Other _____	❑ Fixed Temp Thermostat ❑ Broker Thermostat ❑ Different Programmable Thermostat ❑ Other _____	❑ Yes ❑ No				
7-Day Programmable Thermostat			❑ Furnace ❑ Boiler ❑ Rooftop Unit, ❑ Other _____	❑ Fixed Temp Thermostat ❑ Broker Thermostat ❑ Different Programmable Thermostat ❑ Other _____	❑ Yes ❑ No				
7-Day Programmable Thermostat			❑ Furnace ❑ Boiler ❑ Rooftop Unit, ❑ Other _____	❑ Fixed Temp Thermostat ❑ Broker Thermostat ❑ Different Programmable Thermostat ❑ Other _____	❑ Yes ❑ No				
7-Day Programmable Thermostat			❑ Furnace ❑ Boiler ❑ Rooftop Unit, ❑ Other _____	❑ Fixed Temp Thermostat ❑ Broker Thermostat ❑ Different Programmable Thermostat ❑ Other _____	❑ Yes ❑ No				
7-Day Programmable Thermostat			❑ Furnace ❑ Boiler ❑ Rooftop Unit, ❑ Other _____	❑ Fixed Temp Thermostat ❑ Broker Thermostat ❑ Different Programmable Thermostat ❑ Other _____	❑ Yes ❑ No				

ANTICIPATED TOTAL REBATE: $

Appendix B. Criteria 3

TERMS AND CONDITIONS

1. Definitions

(a) "Program Administrator" means Berkshire Gas, Columbia Gas of Massachusetts, National Grid Gas (MA), New England Gas, NSTAR Gas, or Unitil, as applicable.
(b) "Customers" are commercial natural gas customers in Massachusetts on a qualifying rate code.
(c) "Rebate" means those payment(s) made by the Program Administrator to Customers pursuant to the Program and these Terms and Conditions.
(d) "Program" means the energy efficiency program offered by the Program Administrator to Customers.
(e) "EEMs" are those energy efficiency measures described in the Program Materials or other custom measures that may be approved, in writing, by the Program Administrator.
(f) "Program Materials" means the documents and information provided by the Program Administrator specifying the qualifying EEMs, technology requirements, costs and other Program requirements.

2. Customer Eligibility

(a) You must be an eligible Customer of a Program Administrator to participate and qualify for a Rebate.
(b) Equipment purchases and installations made between January 1, 2012 and December 31, 2012 are eligible for Rebates.
(c) Equipment must be installed by a licensed heating or plumbing contractor at the Customer's address listed on the rebate form.
(d) The Customer must send a complete, signed rebate form along with original dated receipts and any other required information or documentation to the Program Administrator within sixty (60) days from installation date.

3. Installation Verification

The Program Administrator is not obligated to pay any Rebate until the Program Administrator has performed a satisfactory pre-installation inspection (unless the Program Materials state such pre-inspection is not required) and post-installation verification of the installation. The Program Administrators or its representatives, reserve the right to perform pre - and post - installation monitoring and inspection of the installed equipment for a three year period following the completion of the installation in order to determine the energy savings. If the Program Administrator determines that any EEMs were not installed in accordance with program requirements, the Program Administrator shall have the right to require modifications before having the obligation to make any Rebate payments. To the extent applicable, the Program Administrator may, at its sole discretion, withhold payment of any Rebate until Program Administrator verifies that the Customer has received, as appropriate, final drawings, operation and maintenance manuals, operator training, and the Program Administrator has received documentation detailing the installation of the EEMs in accordance with these Terms and Conditions and the Program Materials. The Customer shall provide access and information to the Program Administrator and reasonably cooperate in good faith with the Program Administrator regarding such activity. The Customer understands that the scope of the review by the Program Administrator does not include any kind of safety, code, or other compliance review or inspection.

4. No Warranties or Representations

(a) TO THE FULLEST EXTENT ALLOWED BY LAW, THE PROGRAM ADMINISTRATOR DOES NOT ENDORSE, GUARANTEE, OR WARRANT ANY CONTRACTOR, MANUFACTURER OR PRODUCT, AND THE PROGRAM ADMINISTRATOR MAKES NO WARRANTIES OR GUARANTEES IN CONNECTION WITH ANY PROJECT, OR ANY SERVICES PERFORMED IN CONNECTION HEREWITH OR THEREWITH, WHETHER STATUTORY, ORAL, WRITTEN, EXPRESS, OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THIS DISCLAIMER SHALL SURVIVE ANY CANCELLATION, COMPLETION, TERMINATION OR EXPIRATION OF THE CUSTOMER'S PARTICIPATION IN THE PROGRAM. CUSTOMER ACKNOWLEDGES AND AGREES THAT ANY WARRANTIES PROVIDED BY ORIGINAL MANUFACTURERS', LICENSORS', OR PROVIDERS' OF MATERIAL, EQUIPMENT, OR OTHER ITEMS PROVIDED OR USED IN CONNECTION WITH THE PROGRAM UNDER THESE TERMS AND CONDITIONS, INCLUDING ITEMS INCORPORATED IN THE PROGRAM, ("THIRD PARTY WARRANTIES") ARE NOT TO BE CONSIDERED WARRANTIES OF THE PROGRAM ADMINISTRATOR AND THE PROGRAM ADMINISTRATOR MAKES NO REPRESENTATIONS, GUARANTEES, OR WARRANTIES AS TO THE APPLICABILITY OR ENFORCEABILITY OF ANY SUCH THIRD PARTY WARRANTIES. THE TERMS OF THIS SECTION SHALL GOVERN OVER ANY CONTRARY VERBAL STATEMENTS OR LANGUAGE APPEARING IN ANY PROGRAM ADMINISTRATOR'S OTHER DOCUMENTS.

(b) Neither the Program Administrator nor any of its employees or contractors is responsible for determining that the design, engineering or installation of the EEMs is proper or complies with any particular laws, codes, or industry standards. The Program Administrator does not make any representations of any kind regarding the benefits or energy savings to be achieved by the EEMs or the adequacy or safety of the EEMs.

(c) Customer acknowledges and agrees that it is solely responsible (directly-based on its own judgment or indirectly-based on the advice of its independent expert, not the Program Administrator) for all aspects of the EEMs and related work including, but not limited to: selecting the equipment; selecting contractors to perform the work; inspecting the work and the equipment; ensuring that the equipment is in good working order and condition; ensuring that the equipment is of the manufacture, design specifications, size and capacity selected by the Customer and that the same is properly installed and suitable for Customer's purposes; and determining if work was properly performed and meets Program requirements and applicable laws, regulations and codes.

(d) Customer agrees and acknowledges that Program Administrator is not a manufacturer of, or regularly engaged in the sale or distribution of, or an expert with regard to, any equipment or work.

(e) The provisions of this Section 4 shall survive the termination, cancellation or completion of the Customer's participation in the Program.

5. Changes to High-Efficiency Equipment Rebate Program

The Customer understands that the Program is subject to change by the Program Administrator, at its sole discretion, without prior notice to the Customer. The Customer further understands that Rebate offers may increase or decrease at any time.

Appendix B. Criteria 3

TERMS AND CONDITIONS - *continued*

6. Tax Liability

Participants in the Program may be subject to tax liability for the value of goods and services received through the Program pursuant to state or federal income tax codes. The Program Administrator and the rebate administrator are not responsible for any tax liability which may be imposed as a result of receipt of the Rebates provided by the Program Administrator to the Customer.

7. Indemnification

The Customer shall indemnify, defend and hold harmless Program Administrator, its affiliates and their respective contractors, officers, directors, employees, agents, representatives from and against any and all claims, damages, losses and expenses, including reasonable attorneys' fees and costs incurred to enforce this indemnity, arising out of, resulting from, or related to the Program or the performance of any services or other work in connection with the Program ("Damages"), arising directly or indirectly out of or in connection with the installation or related services and material or caused or alleged to be caused in whole or in part by any actual or alleged act or omission of the Customer, any contractor, subcontractor, agent, third party, or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable. The provisions of this Section 7 shall survive the termination, cancellation or completion of the Customer's participation in the Program.

8. Limitation of Liability

To the fullest extent allowed by law, the Program Administrator's liability shall be limited to paying approved Rebates in accordance with these Terms and Conditions and the Program Materials. The Program Administrator and its affiliates and their respective contractors, officers, directors, employees, agents, representatives shall have absolutely no liability to the Customer or any other party for any other obligation. In no event, whether as a result of breach of contract, tort (including negligence and strict liability), or any other theory of recovery shall the Program Administrator be liable in connection with this Agreement or the Program for any or all special, indirect, incidental, penal, punitive or consequential damages of any nature whether or not (i) such damages were reasonably foreseeable or (ii) the Program Administrator was advised or aware that such damages might be incurred. The provisions of this Section 8 shall survive the termination, cancellation or completion of the Customer's participation in the Program.

9. Release

To the fullest extent allowed by law and as part of the consideration for participation in the Program, the Customer waives and releases the Program Administrator and its affiliates from all obligations (other than payment of a Rebate(s)), and for any liability or claim associated with the EEMs, the performance of the EEMs, the Program and associated work or items, or these Terms and Conditions. The provisions of this Section 9 shall survive the termination, cancellation or completion of the Customer's participation in the Program.

10. Rebate Amounts

The Program Administrator shall provide Rebate(s) for approved equipment up to the rebate amount indicated in the Customer's application. Projects greater than five (5) or more units and/or $25,000 in Rebates require pre-approval from the Program Administrator for rebate funds to be reserved.

11. Monitoring and Inspection

The Program Administrators or its representatives, reserve the right to perform pre- and post- installation monitoring and inspection of the installed equipment for a three year period following the completion of the installation in order to determine the energy savings. The Customer shall provide access and information to the Program Administrator and cooperate with the Program Administrator regarding such activity. The scope of the review by the Program Administrator does not include any kind of safety, code, or other compliance review or inspection. The provisions of this Section 11 shall survive the termination, cancellation or completion of the Customer's participation in the Program.

12. Miscellaneous

(a) Paragraph headings are for the convenience of the parties only and are not to be construed as part of these Terms and Conditions.

(b) If any provision of these Terms and Conditions is deemed invalid by any court or administrative body having jurisdiction, such ruling shall not invalidate any other provision, and the remaining provisions shall remain in full force and effect in accordance with their terms.

(c) These Terms and Conditions shall be interpreted and enforced according to the laws of the Commonwealth of Massachusetts.

(d) In the event of any conflict or inconsistency between these Terms and Conditions and any Program Materials, these Terms and Conditions shall be controlling.

(e) Except as expressly provided herein, there shall be no modification or amendment to these Terms and Conditions or the Program Materials unless such modification or amendment is in writing and signed by a duly authorized officer of the Program Administrator.

(f) The provisions of Sections 4, 6, 7, 8 ,9 and 11 and any other provision that specifies by its terms that it survives termination, shall survive the termination or expiration of the Customer's participation in the Program.

(g) Counterpart Execution; Scanned Copy. Any and all agreements and documents requiring signature related to the Program may be executed in several counterparts, each of which, when executed, shall be deemed to be an original, but all of which together shall constitute one and the same instrument. A scanned or electronically reproduced copy or image of such agreements and documents bearing the signatures of the parties shall be deemed an original and may be introduced or submitted in any action or proceeding as competent evidence of the execution, terms and existence of such agreements and documents notwithstanding the failure or inability to produce or tender an original, executed counterpart of the same and without the requirement that the unavailability of such original, executed counterpart of the same first be proven.

Appendix B. Criteria 3
2012 MA Cool Smart Residential Rebate Application

Offer valid on equipment purchased and installed between **January 1, 2012 – December 31, 2012** (subject to funding availability). **All submissions must be postmarked by January 31, 2013**

Rebates	Qualifying Products	SEER[1]	EER[2]	HSPF[3]
$150	Central AC/Air Source Heat Pump	≥ 14.5	≥ 12	≥ 8.2
$300	Central AC/Air Source Heat Pump	≥ 15	≥ 12.5	≥ 8.5
$500	Central AC	≥ 16	≥ 13	n/a
$500	Ductless Mini-Split	≥ 14.5	≥ 12	≥ 8.2

Ask your Contractor for a Quality Installation Verification Test.

Have your ducted heat pump or Central AC equipment installed and properly tested by a Cool Smart trained participating contractor and receive an additional $150 rebate.

See page 2 for complete details.

[1]SEER – Seasonal Energy Efficiency Ratio. [2]EER – Energy Efficiency Ratio is a measure of instantaneous cooling efficiency. [3]HSPF – Heating Seasonal Performance Factor.

To receive your rebate check by mail, follow these steps:

1) Purchase and install an ENERGY STAR® qualifying product at a property with an active electric account with one of the participating energy efficiency providers.

2) Obtain your contractor's invoice with equipment make, coil and condenser model numbers, size in tons, date and location of installation and total installation cost.

3) Mail the following to the address on the right.

a. This application, completed accurately and legibly.

b. Contractor's invoice showing required information and proof of purchase.

c. Copy of Load (Sizing) Calculation "ACCA approved version 8 Manual J" *For ductless mini-splits only, 3 or more units require Manual J.

d. TXV or EXV valve installed (REQUIRED to qualify for rebate).

e. A copy of the AHRI Certificate. Visit www.ahridirectory.org or contact your heating and air conditioning contractor to obtain a copy.

Send completed application with all corresponding documentation to:

COOL SMART (MA)
Offer # H144009
PO Box 130013
El Paso, TX 88513-0013

Please allow 4-6 weeks for processing. To review the status of your application or to ask questions, call **1-877-333-8153** or visit **www.smartenergy-zone.com/coolsmart.**

CUSTOMER INFORMATION

(check one) ☐ NSTAR Electric ☐ National Grid ☐ Western Massachusetts Electric Co ☐ Cape Light Compact ☐ Unitil

Customer Name: **Electric Account Number:**

Address: (where equip. was installed) City: State: MA Zip Code:

Home Phone: Business Phone: E-Mail Address:

MAIL REBATE TO (if different from above)

Name:

Tax I.D. Number (if owner is incorporated and rebate is over $600):

Address: City: State: Zip Code:

CONTRACTOR INFORMATION (Contractor Questions: Call 1-800-473-1105 or e-mail info@mycoolsmart.com)

Company Name: **Contact Person:**

Address: City: State: Zip Code:

Telephone Number: E-Mail Address: Is technician NATE Certified? (not required for rebate eligibility) ☐ Yes ☐ No

NEW EQUIPMENT INSTALLED (to be completed by contractor)

☐ New construction with ENERGY STAR® Homes ☐ New construction ☐ Replacement system ☐ Adding cooling to existing ductwork ☐ New or additional ductwork and air conditioning

1
Install Date: (MM/DD/YYYY) Install Cost: AHRI Ref. #: Manufacturer: TXV or EXV Installed** (Required): ☐ Yes
Condenser Model #: Coil Model #: AHRI-Rated SEER*: AHRI-Rated EER*: HSPF:
New Unit Size (Tons***): Mini Split: ☐ Yes ☐ No Quality Installation Verification Test Performed? ☐ Yes ☐ No Rebate Amount:

2
Install Date: (MM/DD/YYYY) Install Cost: AHRI Ref. #: Manufacturer: TXV or EXV Installed** (Required): ☐ Yes
Condenser Model #: Coil Model #: AHRI-Rated SEER*: AHRI-Rated EER*: HSPF:
New Unit Size (Tons***): Mini Split: ☐ Yes ☐ No Quality Installation Verification Test Performed? ☐ Yes ☐ No Rebate Amount:

3
Install Date: (MM/DD/YYYY) Install Cost: AHRI Ref. #: Manufacturer: TXV or EXV Installed** (Required): ☐ Yes
Condenser Model #: Coil Model #: AHRI-Rated SEER*: AHRI-Rated EER*: HSPF:
New Unit Size (Tons***): Mini Split: ☐ Yes ☐ No Quality Installation Verification Test Performed? ☐ Yes ☐ No Rebate Amount:

*AHRI SEER and EER rating of outdoor condenser and indoor coil working together. Rounding up of SEER/EER ratings is not acceptable.
**Thermostatic Expansion Valve (TXV) or Electronic Expansion Valve (EXV) required for all systems. ***NOTE: 1 ton = 12,000 Btu/hour, needed for Right Sizing.

Total Rebate Expected:

2012 MA Residential Cool Smart Program
Terms and Conditions

ENERGY STAR® EQUIPMENT REQUIREMENTS

System Requirements: All rebated central air conditioning (A/C) units/systems or electric air source heat pumps must be ENERGY STAR qualified, listed with and certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), and meet the program SEER, EER and HSPF requirements (see table on page 1). The A/C condenser and the evaporative coil must be new and replaced together. The condenser and coil are separate components in a split A/C or heat pump system, but for rebate purposes, are considered one unit. For mini split ductless systems, for rebate purposes, the unit consists of outdoor condenser and indoor unit(s).

Sizing: Load calculation requires proper design temperatures for area, and unit installed must be within ½ ton of calculation.

Proof of Purchase: A copy of the customer's invoice itemizing the purchased equipment must accompany each rebate application form. The invoice must indicate the equipment type, size, make, model, name of purchaser, installation date and location, date of purchase and total installed cost.

Information Sources to Verify ENERGY STAR Equipment: EER, SEER and HSPF ratings (for heat pumps only) for condenser, evaporator and air handler (if applicable) must be provided. Both the Consortium for Energy Efficiency (ceehvacdirectory.org) and the AHRI directory (ahridirectory.org or call 703-600-0384) web sites list SEER and EER values. AHRI also provides AHRI numbers. Manufacturer's spec sheets may be accepted ONLY if equipment is not yet AHRI rated and ONLY if AHRI listing is pending.

Owner's Certification: Owner certifies that he/she has purchased and installed the equipment listed on this application at the defined location. Owner agrees that all information is true and that he/she has conformed to all offer and equipment requirements listed. Owner has verified that the units(s) listed on this application have been installed or serviced correctly. There are no unusual noises or vibrations and all controls have been calibrated. Owner or owner's representative has been instructed on how to operate and maintain this equipment and has received all necessary operation and maintenance manuals provided by the manufacturer with the new unit(s).

GENERAL REQUIREMENTS

Time Limit: Qualifying units for equipment rebate must be purchased and installed between January 1, 2012 and December 31, 2012. Applications must be postmarked by January 31, 2013. For new construction only, extension of 2012 offers up to the end of 2013 must be requested and approved in 2012. Program is subject to change without prior notice, including rebates and incentive levels.

Geographic Requirements: Offers valid only for residential electric customers in MA where COOL SMART is offered by National Grid, NSTAR Electric, Western Massachusetts Electric Co., Unitil, and Cape Light Compact.

Application Form: This application must be filled out completely, truthfully, and accurately. The customer or contractor must date and submit the completed application along with all required documentation for specific rebates and/or incentives. By submitting the rebate application, the customer and contractor agree to abide by these Terms and Conditions.

Payments: From the time the application is processed and approved, please allow 4–6 weeks for payment. Payment processing may take longer if information or documentation are missing from the application.

Voluntary Quality Installation Verification Incentive: Qualifying equipment must be installed and properly tested by a Cool Smart trained participating contractor listed on www.MassSave.com. The additional incentive applies to each system tested and will be mailed separately from the rebate payment. Contractor must verify proper refrigerant charge and operating capacity of the unit. Test conditions must be 60°F+ Outdoor (not raining), 65+F Indoor Dry Bulb / 55F+ Indoor Wet Bulb Temperatures and cannot be performed after October 15th, 2012.

Approval and Verification: Sponsors reserve the right to verify and to have reasonable access to the residence to inspect the HVAC system installed prior to issuing rebates and incentives; this right to access extends up to one year after date of application, even if rebates or incentives have been paid.

Tax Liability: Sponsors will not be responsible for any tax liability that may be imposed on the customer or contractor as a result of the payment of rebates.

Endorsement: Sponsors do not endorse any particular manufacturer, product, system design, or technology in promoting these offers.

Warranties: SPONSORS DO NOT WARRANT THE PERFORMANCE OF INSTALLED OR SERVICED EQUIPMENT, EXPRESSLY OR IMPLICITLY. Program sponsors make no warranties or representations of any kind, whether statutory, expressed, or implied, including, without limitations, warranties or merchantability or fitness for a particular purpose regarding the HVAC equipment or services provided by a manufacturer or vendor. Contact your contractor for details regarding equipment performance and warranties.

Limitation of Liability: Sponsors and their rebate administrator's liability is limited to paying the rebate and incentive specified. Sponsors and their rebate administrator are not liable for any consequential or incidental damages or for any damages in tort connected with or resulting from participation in these offers.

Contractor Certification: Contractor certifies that installation and services performed have been in accordance with all applicable municipal, state and federal codes, standards and regulations, as well as program requirements.

Energy Benefits: Customer agrees that the Energy Efficiency Program Provider (EEPP) has the unilateral right to apply for any ISO-NE capacity payments or environmental credits resulting from this energy efficiency project, and agrees not to file for such payments or credits either directly or indirectly. Manufacturer and/or retailer agree to provide the EEPP with such further documentation as the EEPP may request to confirm the EEPP's ownership of such benefits.

mass save
Savings through energy efficiency

High-Efficiency Commercial Natural Gas Equipment Rebates

Save energy with high-efficiency equipment. Rebates are provided to reduce the cost difference between standard efficiency and high-efficiency equipment.

- High-Efficiency Heating Equipment
- High-Efficiency Water Heating Equipment
- After Market Boiler Reset Controls
- Programmable Thermostats
- Steam Traps

Electric Program Administrators

Cape Light Compact
PO Box 427 SCH.
Barnstable, MA 02630
www.capelightcompact.org
efficiency@capelightcompact.org

nationalgrid
The power of action.
40 Sylvan Road
Waltham, MA 02451
1-800-787-1706
www.powerofaction.com/efficiency
efficiency@us.ngrid.com

NSTAR
One NSTAR Way, SW360
Westwood, MA 02090
1-781-441-8592
www.nstar.com
efficiency@nstar.com

Unitil
285 John Fitch Highway
Fitchburg, MA 01420
1-888-301-7700
www.unitil.com
efficiency@unitil.com

Western Massachusetts Electric
The Northeast Utilities System
P.O. Box 2010
West Springfield, MA 01090-2010
www.wmeco.com
efficiency@wmeco.com

Gas Program Administrators

Bay State Gas
A NiSource Company
www.baystategas.com
efficiency@baystategas.com

berkshire gas
Energy You Can Count On. People You Can Trust.
1-800-944-3212
www.berkshiregas.com
efficiency@berkshiregas.com

New England Gas Company
1-508-324-7811
www.negasco.com
efficiency@sug.com

nationalgrid
The power of action.
1-800-843-3636
www.powerofaction.com/efficiency
efficiency@us.ngrid.com

NSTAR
www.nstar.com
efficiency@nstar.com

Unitil
1-888-301-7700
www.unitil.com
efficiency@unitil.com

Appendix B. Criteria 3

Instructions

Is your project eligible?

Equipment shall be new and shall be installed in a commercial, industrial, institutional, educational, multifamily, or municipal facility within a Program Administrators (PA's) service territory. Projects that are expected to exceed 5 units and/or $25,000 in rebates will require pre-approval.

Is the equipment you intend to buy eligible?

Product types listed on this form are eligible for prescriptive rebates. However, additional measures not listed here may be eligible for custom rebates.

Pre-Approval Requirements (if applicable):

Applicable if projects are expected to exceed 5 units and/or $25,000 in rebates:

1. Contact your Program Administrator before purchasing and installing the equipment.
2. If the Energy Efficient Measure (EEM) qualifies for a rebate, a "pre-approved rebate letter" will be issued.

Installation and Rebate Requirements:

1. Once pre-approved (if applicable), purchase and install the qualifying equipment within twelve (12) months of PA's pre-approval.
2. Return this completed application form with an authorized signature, as well as the required information listed below, to:

Commercial Natural Gas Rebates
40 Washington Street, Suite 2000
Westborough, MA 01581
1-800-232-0672

- A copy of the completed and signed pre-approval application (if applicable)
- A copy of the pre-approval rebate letter (if applicable)
- Manufacturer's technical specification sheets ("cut sheets") for each type of eligible equipment purchased
- A copy of your invoice indicating Proof of Purchase — must indicate type, size, make, and model number of the equipment; date of purchase; and date of installation.

3. At the post-installation verification, the customer is required to sign the post-installation customer acknowledgement section of the original application.

Program Details:

This rebate program applies to applications created on or after January 28, 2010. Equipment must be installed by December 31, 2010. Details of this program, including rebate levels, are subject to change without prior notice. Contact your Program Administrator for the latest program details.

2010 High-Efficiency Natural Gas Equipment Rebates

HEATING EQUIPMENT

FURNACES	RATING	REBATE
up to 150 MBH	92% AFUE* or greater	$400
up to 150 MBH	92% AFUE or greater & ECM motor	$500
up to 150 MBH	94% AFUE or greater & ECM motor	$650

CONDENSING UNIT HEATERS	RATING	REBATE
up to 300 MBH	90% Thermal Efficiency or greater	$500

INFRARED HEATERS	RATING	REBATE
all sizes	Low Intensity	$500

STEAM BOILERS	RATING	REBATE
up to 300 MBH	82% AFUE or greater	$200

HYDRONIC BOILERS	RATING	REBATE
up to 300 MBH	85% AFUE or greater	$500
301 to 499 MBH	85% Thermal Efficiency or greater	$2,000
500 to 999 MBH	85% Thermal Efficiency or greater	$2,500
1000 to 1700 MBH	85% Thermal Efficiency or greater	$3,500
1701 to 2000 MBH	85% Thermal Efficiency or greater	$5,000

CONDENSING BOILERS	RATING	REBATE
up to 300 MBH	90% AFUE or greater	$1,000
301 to 499 MBH	90% Thermal Efficiency or greater	$3,000
500 to 999 MBH	90% Thermal Efficiency or greater	$5,000
1000 to 1700 MBH	90% Thermal Efficiency or greater	$10,000
1701 to 2000 MBH	90% Thermal Efficiency or greater	$15,000

WATER HEATING EQUIPMENT

ON DEMAND TANKLESS	RATING	REBATE
with electronic ignition	Energy Factor of .82 or greater	$700

HIGH-EFFICIENCY INDIRECT WATER HEATER	REBATE
	$500

CONDENSING STAND ALONE	RATING	REBATE
75 to 300 MBH	95% Thermal Efficiency or greater	$500

ENERGY STAR® FREESTANDING	RATING	REBATE
	Energy Factor of .62 or greater	$50

INTEGRATED WATER HEATER/CONDENSING BOILER

RATING[1]	REBATE
85% AFUE/CA-AFUE	$1,000
90% AFUE/CA-AFUE	$1,600

[1] *Must be considered one unit by manufacturer.*

CONTROLS EQUIPMENT

	REBATE
AFTER MARKET BOILER RESET CONTROLS	$200/ea.
STEAM TRAPS	$25/ea.
ENERGY STAR® OR 7-DAY PROGRAMMABLE THERMOSTATS	$25/ea.

* AFUE = Annual Fuel Utilization Efficiency

NOTE: All equipment must meet program guidelines.
All rebates are given on a per-unit basis.
All MBH levels are based on the unit's input.

SOME RESTRICTIONS MAY APPLY. REBATE OFFERS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

A listing of qualifying heating equipment is available at www.ahridirectory.org

Appendix B. Criteria 3

NATURAL GAS

2010 Heating, Water Heating & Controls

mass save
Savings through energy efficiency
40 Washington Street, Suite 2000
Westborough, MA 01581
1-800-232-0672

Customer Information

COMPANY NAME _____ **APPLICATION DATE** _____

INSTALLATION SITE _____ **PHONE NUMBER** _____

CONTACT PERSON _____ **FAX NUMBER** _____

E-MAIL ADDRESS _____ **SQ. FT.** (covered by this application) _____

STREET ADDRESS _____ **CITY** _____ **STATE** _____ **ZIP** _____

MAILING ADDRESS (if different) _____ **CITY** _____ **STATE** _____ **ZIP** _____

ELECTRIC COMPANY NAME _____ **ELECTRIC ACCOUNT #** (or copy of electric bill) _____

GAS COMPANY NAME _____ **GAS ACCOUNT #** (or copy of gas bill) _____

BUILDING TYPE: (select one) **TOTAL FACILITY SQ. FT.** _____

☐ Assembly	☐ Fast Food	☐ Hotel	☐ Multi Story Retail	☐ Religious	☐ Small Retail
☐ Automobile	☐ Full Service Restaurant	☐ Large Refrigerated Space	☐ Multifamily high-rise	☐ K-12 Schools	☐ University
☐ Big Box	☐ Grocery	☐ Large Office	☐ Multifamily low-rise	☐ Small Office	☐ Warehouse
☐ Community College	☐ Heavy Industrial	☐ Light Industrial	☐ Other _____		
☐ Dormitory	☐ Hospital	☐ Motel			

Payment Method

CHECK PAYABLE TO: (fill in data below) ☐ Customer ☐ Vendor/Installer

TAX ID# _____ **COMPANY TYPE:** (Check one: ○ Incorporated, ○ Not Incorporated, ○ Exempt)

Vendor Information

VENDOR/INSTALLER _____ **STREET ADDRESS** _____

CONTACT PERSON _____ **CITY** _____ **STATE** _____ **ZIP** _____

PHONE NUMBER _____ **E-MAIL** _____

Customer Acknowledgement

I hereby request a rebate for the equipment listed. Attached are copies of all receipts. I have read and agree to the Terms and Conditions on the reverse of this form. I certify that a licensed contractor has installed the listed equipment (when applicable) in accordance with Program Guidelines and Terms and Conditions. I certify that I have seen the Energy Efficient Measures that have been installed and I am satisfied with their installation.

AUTHORIZED SIGNATURE _____ **DATE** _____

NAME (print) _____

For Program Administrators Only:

Required Inspections	Date	Inspector	Project Costs:	
Post Inspection:			Labor $:	
Approval	Date	Program Manager		
Final Incentive:			Material $:	

Measure Information — Heating and Water Heating

Type of Equipment Installed	Manufacturer	Model Number	Rating (Thermal Efficiency, AFUE or Energy Factor)	Input/ Size	Installed Cost	Rebate Amount*	Quantity Installed*	Anticipated Rebate*
Furnace								
Condensing Unit Heater								
Infrared Heater								
Steam Boiler								
Hydronic Boiler								
Condensing Boiler								
On-Demand Tankless Water Heater								
Indirect Water Heater								
Condensing Stand Alone Water Heater								
Integrated Water Heater/Condensing Boiler								
ENERGY STAR Storage Water Heater								

Projects that are expected to exceed 5 units and/or $25,000 in rebates will require pre-approval.

Anticipated Total Rebate	

Measure Information — Controls

Type of Equipment Installed	Manufacturer	Model Number	Size of Unit Controlled (BTU)	Installed Cost	Rebate Amount	Quantity Installed	Anticipated Rebate
After Market Boiler Reset Controls							
Steam Traps							
ENERGY STAR® or 7-day programmable thermostats[1]							

Anticipated Total Rebate	

[1]For thermostat rebates, please answer the following questions:

Type of Unit Being Controlled	What is thermostat replacing?	Does thermostat control air conditoning?
❒ Furnace ❒ Boiler ❒ Other, _____	❒ Fixed temperature thermostat ❒ Broken or inoperable thermostat ❒ Different programmable thermostat ❒ Other, _____	❒ Yes ❒ No

Terms and Conditions

1. Definitions

(a) "Program Administrator" means Bay State Gas, Berkshire Gas, National Grid Gas (MA), New England Gas, NSTAR Gas, or Unitil, as applicable.
(b) "Customers" are commercial natural gas customers in Massachusetts on a qualifying rate code.
(c) "Rebate" means those payment(s) made by the Program Administrator to Customers pursuant to the Program and these Terms and Conditions.
(d) "Program" means the energy efficiency program offered by the Program Administrator to Customers.
(e) "EEMs" are those energy efficiency measures described in the Program Materials or other custom measures that may be approved, in writing, by the Program Administrator.
(f) "Program Materials" means the documents and information provided by the Program Administrator specifying the qualifying EEMs, technology requirements, costs and other Program requirements

2. Customer Eligibility

a) You must be an eligible Customer of a Program Administrator to participate and qualify for a Rebate.
b) Equipment purchases and installations made between January 28, 2010 and December 31, 2010 are eligible for Rebates.
c) Equipment must be installed by a licensed heating or plumbing contractor at the Customer's address listed on the rebate form.
d) The Customer must send a complete, signed rebate form along with original dated receipts and any other required information or documentation to the Program Administrator within sixty (60) days from installation date
e) All rebate forms in connection with the Program must be received by the Program Administrator by February 28, 2011.

3. Installation Verification

The Program Administrator is not obligated to pay any Rebate until the Program Administrator has performed a satisfactory pre-installation inspection (unless the Program Materials state such pre-inspection is not required) and post-installation verification of the installation. The Program Administrators or its representatives, reserves the right to perform pre- and post- installation monitoring and inspection of the installed equipment for a three year period following the completion of the installation in order to determine the energy savings. If the Program Administrator determines that any EEMs were not installed in accordance with program requirements, the Program Administrator shall have the right to require modifications before having the obligation to make any Rebate payments. To the extent applicable, the Program Administrator may, at its sole discretion, withhold payment of any Rebate until Program Administration verifies that the Customer has received, as appropriate, final drawings, operation and maintenance manuals, and operator training, and the Program Administrator has received documentation detailing the installation of the EEMs in accordance with these Terms and Conditions and the Program Materials. The Customer shall provide access and information to the Program Administrator and reasonably cooperate in good faith with the Program Administrator regarding such activity. The Customer understands that the scope of the review by the Program Administrator does not include any kind of safety, code, or other compliance review or inspection.

4. No Warranties or Representations

(a) TO THE FULLEST EXTENT ALLOWED BY LAW, THE PROGRAM ADMINISTRATOR DOES NOT ENDORSE, GUARANTEE, OR WARRANT ANY CONTRACTOR, MANUFACTURER OR PRODUCT, AND THE PROGRAM ADMINISTRATOR MAKES NO WARRANTIES OR GUARANTEES IN CONNECTION WITH ANY PROJECT, OR ANY SERVICES PERFORMED IN CONNECTION HEREWITH OR THEREWITH, WHETHER STATUTORY, ORAL, WRITTEN, EXPRESS, OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THIS DISCLAIMER SHALL SURVIVE ANY CANCELLATION, COMPLETION, TERMINATION OR EXPIRATION OF THE CUSTOMER'S PARTICIPATION IN THE PROGRAM. CUSTOMER ACKNOWLEDGES AND AGREES THAT ANY WARRANTIES PROVIDED BY ORIGINAL MANUFACTURERS', LICENSORS', OR PROVIDERS' OF MATERIAL, EQUIPMENT, OR OTHER ITEMS PROVIDED OR USED IN CONNECTION WITH THE PROGRAM UNDER THESE TERMS AND CONDITIONS, INCLUDING ITEMS INCORPORATED IN THE PROGRAM, ("THIRD PARTY WARRANTIES") ARE NOT TO BE CONSIDERED WARRANTIES OF THE PROGRAM ADMISTRATOR AND THE PROGRAM ADMINISTRATOR MAKES NO REPRESENTATIONS, GUARANTEES, OR WARRANTIES AS TO THE APPLICABILITY OR ENFORCEABILITY OF ANY SUCH THIRD PARTY WARRANTIES. THE TERMS OF THIS SECTION SHALL GOVERN OVER ANY CONTRARY VERBAL STATEMENTS OR LANGUAGE APPEARING IN ANY PROGRAM ADMINISTRATOR'S OTHER DOCUMENTS.
(b) Neither the Program Administrator nor any of its employees or contractors is responsible for determining that the design, engineering or installation of the EEMs is proper or complies with any particular laws, codes, or industry standards. The Program Administrator does not make any representations of any kind regarding the benefits or energy savings to be achieved by the EEMs or the adequacy or safety of the EEMs.
(c) Customer acknowledges and agrees that it is solely responsible (directly-based on its own judgment or indirectly-based on the advice of its independent expert (not the Program Administrator) for all aspects of the EEMs and related work including, but not limited to: selecting the equipment; selecting contractors to perform the work; inspecting the work and the equipment; ensuring that the equipment is in good working order and condition; ensuring that the equipment is of the manufacture, design specifications, size and capacity selected by the Customer and that the same is properly installed and suitable for Customer's purposes; and determining if work was properly performed and meets Program requirements and applicable laws, regulations and codes. (d) Customer agrees and acknowledges that Program Administrator is not a manufacturer of, or regularly engaged in the sale or distribution of, or an expert with regard to, any equipment or work.
(e) The provisions of this Section 4 shall survive the termination, cancellation or completion of the Customer's participation in the Program.

5. Changes to High-Efficiency Equipment Rebate Program

The Customer understands that the Program is subject to change by the Program Administrator, at its sole discretion, without prior notice to the Customer. The Customer further understands that Rebate offers may increase or decrease at any time.

6. Tax Liability
Participants in the Program may be subject to tax liability for the value of goods and services received through the Program pursuant to state or federal income tax codes. The Program Administrator and the rebate administrator are not responsible for any tax liability which may be imposed as a result of receipt of the Rebates provided by the Program Administrator to the Customer.

7. Indemnification
The Customer shall indemnify, defend and hold harmless Program Administrator, its affiliates and their respective contractors, officers, directors, employees, agents, representatives from and against any and all claims, damages, losses and expenses, including reasonable attorneys' fees and costs incurred to enforce this indemnity, arising out of, resulting from, or related to the Program or the performance of any services or other work in connection with the Program ("Damages"), arising directly or indirectly out of or in connection with the installation or related services and material or caused or alleged to be caused in whole or in part by any actual or alleged act or omission of the Customer, any contractor, subcontractor, agent, third party, or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable. The provisions of this Section 7 shall survive the termination, cancellation or completion of the Customer's participation in the Program.

8. Limitation of Liability
To the fullest extent allowed by law, the Program Administrator's liability shall be limited to paying approved Rebates in accordance with these Terms and Conditions and the Program Materials. The Program Administrator and its affiliates and their respective contractors, officers, directors, employees, agents, representatives shall have absolutely no liability to the Customer or any other party for any other obligation. In no event, whether as a result of breach of contract, tort (including negligence and strict liability), or any other theory of recovery shall the Program Administrator be liable in connection with this Agreement or the Program for any or all special, indirect, incidental, penal, punitive or consequential damages of any nature whether or not (i) such damages were reasonably foreseeable or (ii) the Program Administrator was advised or aware that such damages might be incurred. The provisions of this Section 8 shall survive the termination, cancellation or completion of the Customer's participation in the Program.

9. Release
To the fullest extent allowed by law and as part of the consideration for participation in the Program, the Customer waives and releases the Program Administrator and its affiliates from all obligations (other than payment of a Rebate(s)), and for any liability or claim associated with the EEMs, the performance of the EEMs, the Program and associated work or items, or these Terms and Conditions. The provisions of this Section 9 shall survive the termination, cancellation or completion of the Customer's participation in the Program.

10. Rebate Amounts
The Program Administrator shall provide Rebate(s) for approved equipment up to the rebate amount indicated in the Customer's application. Projects greater than five (5) or more units and/or $25,000 in Rebates require pre-approval from the Program Administrator for rebate funds to be reserved.

11. Monitoring and Inspection
The Program Administrators or its representatives, reserves the right to perform pre- and post- installation monitoring and inspection of the installed equipment for a three year period following the completion of the installation in order to determine the energy savings. The Customer shall provide access and information to the Program Administrator and cooperate with the Program Administrator regarding such activity. The scope of the review by the Program Administrator does not include an kind of safety, code, or other compliance review or inspection. The provisions of this Section 11 shall survive the termination, cancellation or completion of the Customer's participation in the Program.

12. Miscellaneous

(a) Paragraph headings are for the convenience of the parties only and are not to be construed as part of these Terms and Conditions.
(b) If any provision of these Terms and Conditions is deemed invalid by any court or administrative body having jurisdiction, such ruling shall not invalidate any other provision, and the remaining provisions shall remain in full force and effect in accordance with their terms.
(c) These Terms and Conditions shall be interpreted and enforced according to the laws of the Commonwealth of Massachusetts.
(d) In the event of any conflict or inconsistency between these Terms and Conditions and any Program Materials, these Terms and Conditions shall be controlling.
(e) Except as expressly provided herein, there shall be no modification or amendment to these Terms and Conditions or the Program Materials unless such modification or amendment is in writing and signed by a duly authorized officer of the Program Administrator.
(f) The provisions of Sections ,4, 6, 7, 8 ,9 and 11 and any other provision that specifies by its terms that it survives termination, shall survive the termination or expiration of the Customer's participation in the Program.
(g) Counterpart Execution; Scanned Copy. Any and all agreements and documents requiring signature related to the Program may be executed in several counterparts, each of which, when executed, shall be deemed to be an original, but all of which together shall constitute one and the same instrument. A scanned or electronically reproduced copy or image of such agreements and documents bearing the signatures of the parties shall be deemed an original and may be introduced or submitted in any action or proceeding as competent evidence of the execution, terms and existence of such agreements and documents notwithstanding the failure or inability to produce or tender an original, executed counterpart of the same and without the requirement that the unavailability of such original, executed counterpart of the same first be proven.

Optional Information:

Appendix B. Criteria 3

What was the main reason you purchased a select ENERGY STAR Qualified Refrigerator or Freezer?
Please check one:

- energy savings
- available rebate
- like to buy the best
- takes up less space
- larger capacity
- quieter operation
- concerns with global warming/climate change
- other

Did you know about the rebate before you purchased your refrigerator or freezer?

- yes
- no

If so, did the rebate influence your purchase decision?

- yes
- no

Why did you purchase a refrigerator or freezer at this time?
Check all that apply:

- old machine broke
- wanted upgrade
- energy savings
- remodeling
- new home
- better performance
- new purchase (does not replace old unit)

Have you purchased other ENERGY STAR qualified products?

- yes
- no

How did you hear about ENERGY STAR Qualified Refrigerators or Freezers? Check all that apply:

- newspaper ad
- website
- retailer/salesperson
- news report/article
- magazine ad
- TV ad
- utility bill insert
- friend/relative/co-worker
- other

Email Address _____

- Yes! Sign me up to receive energy saving and incentive information from **MassSave.com**.

ASK ABOUT ENERGY STAR

Congratulations on your decision to buy an ENERGY STAR Qualified Refrigerator or Freezer. It's good for you, your family, and the environment. Thank you!

Savings and energy efficiency experiences may vary. Valid for purchases made January 1, 2012 - December 31, 2012. All rebate requests must be postmarked no later than January 31, 2013. Limit: One refrigerator and one freezer rebate per Massachusetts residential electric account per calendar year. Eligible refrigerator or freezer must be installed in Massachusetts. Refrigerator must be 7.75 cu. ft. or larger to be eligible. Excludes compact models. For more information, call: 1-877-318-8440 or visit Smartenergy-zone.com/MassSave. This rebate offer is available to all Massachusetts residential electric customers of participating utilities and energy efficiency service providers and may be subject to change without prior notice. This rebate may not be combined with any other utility or energy efficiency service provider offer; however, it can be combined with American Recovery and Reinvestment Act (ARRA) incentives. The participating utility or energy efficiency service provider reserves the right to conduct field inspections to verify installations. Limitation of liability: Participating utility or energy efficiency service provider does not guarantee the performance of installed equipment expressly or implicitly. Customer agrees that the Energy Efficiency Program Provider (EEPP) has the unilateral right to apply for any ISO-NE capacity payments or environmental credits resulting from this energy efficiency project, and agrees not to file for such payments or credits either directly or indirectly. Manufacturer and/or retailer agree to provide the EEPP with such further documentation as the EEPP may request to confirm the EEPP's ownership of such benefits.

Mail-in Rebate

$50

ENERGY STAR® Qualified Refrigerators or Freezers

mass save

ASK ABOUT ENERGY STAR

This rebate is for the benefit of Massachusetts electric customers of:

Unitil

Cape Light Compact

NSTAR ELECTRIC

Western Massachusetts Electric
A Northeast Utilities Company

nationalgrid

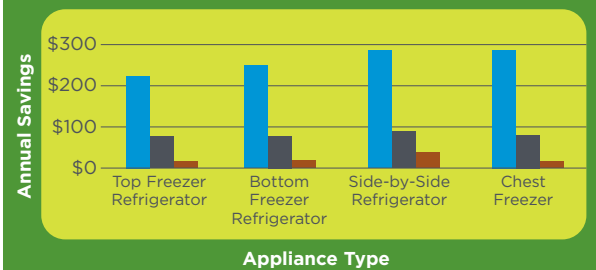
Appendix B. Criteria 3

Get cash back from us.

With a new ENERGY STAR Qualified Refrigerator or Freezer, you can start saving right away. For a limited time, receive a mail-in rebate of $50! Some restrictions may apply. Just ask your local participating retailer for details.

A fridge made before 1993 could be costing you approximately $300 each year to operate, depending on the size and model year. Replace it with a new ENERGY STAR qualified model and cut your related energy costs in half. See the chart below for comparisons of sample equipment types, including savings associated with ENERGY STAR Qualified Freezers.

Typical Annual Savings from Replacing an Old Refrigerator or Freezer with an ENERGY STAR Qualified Model of Equal Size



Year of Purchase

Pre-1993 1993-2000 2001-2008

To receive your rebate:

1) **Please fill out this form completely. All information is required.**
2) Enclose a copy of your dated sales receipt and a recent copy of your electric bill.
3) Mail it to the address provided.

Incomplete information will delay or disqualify your rebate. All rebate requests must be postmarked no later than **January 31, 2013.**

The ENERGY STAR $50 Mail-in Rebate.

Get $50 back from your participating utility or energy efficiency service provider on your purchase of an eligible ENERGY STAR Qualified Refrigerator or Freezer. This rebate is good for purchases made January 1, 2012 through December 31, 2012.

Mail to:
ENERGY STAR Refrigerator/Freezer (MA)
Offer # H542999
P.O. Box 130013
El Paso, TX 88513-0013

(Please DO NOT include rebate coupon with utility bill payment.)

Please fill out completely. All information below is required.

Your Name _____

Account/Installation Address _____

City _____ State _____ Zip _____

Home Phone _____

Mailing Address (if different) _____

City _____ State _____ Zip _____

House type (check one in each row):
own rent
primary residence vacation home
single family condo/townhouse multifamily
____ # of units

For installation address:

Your energy efficiency provider (check one):

NSTAR
Electric Account #

Western Massachusetts Electric Company
Electric Account #

Unitil
Electric Account #

Cape Light Compact
Electric Account #

National Grid
Electric Account #

Manufacturer of ENERGY STAR Qualified Refrigerator or Freezer purchased _____

Model # _____

Name and address of store where refrigerator or freezer was purchased _____

_____

Purchase Price $ _____ Purchase Date ____ /___ /____

Appendix B. Criteria 3

ENERGY STAR® Qualified Monitors & Computers

$20 LCD Monitor Rebate / $10 Desktop Computer Rebate

mass save
Savings through energy efficiency



Valid for purchases made from 01/01/2012 to 12/31/2012. Rebate requests must be postmarked by 01/31/2013.

IMPORTANT

Limit two monitor and two computer rebates per Massachusetts residential electric account per calendar year.

Eligible monitor and/or desktop computer must be installed in Massachusetts.

Call 1-877-ESTAR 4 U (378-2748) or visit MassSave.com for a complete list of participating appliance retailers.

To receive your rebate check by mail, follow these steps:

1) Purchase an ENERGY STAR® Qualified LCD Monitor and/or Desktop Computer and install in a property with an active meter using one of the participating energy efficiency providers electric services.

2) Make a copy of the first page of your most recent electric bill.

3) Mail the following to the address on the right.

- This application, completed accurately and legibly.
- A copy of your most recent electric bill.
- A copy of your receipt reflecting the qualifying purchase and date.

ENERGY STAR Computers/Monitors Rebate (MA)
Offer# H143001
PO Box 130013
El Paso, TX 88513-0013

***Your energy efficiency provider** (check one)

☐ **NSTAR** ☐ **Western Massachusetts Electric Company** ☐ **Unitil** ☐ **Cape Light Compact** ☐ **National Grid**

***Electric Account #** _____

**Denotes Required Field*

*First Name	*Last Name		
*Installation Address			
*City	*State	*Zip Code	
*Mailing Address *(*Required if different from above)*	City	State	Zip Code
Email *(Used to send status updates regarding this application)*		Phone	

*Product(s) Purchased (check all that apply) ☐ monitor - $20 rebate ☐ computer - $10 rebate (Limit two monitor and two desktop computer rebates per account.)

*Monitor Manufacturer Name	*Model	*Purchase Price	*Purchase Date
*Computer Manufacturer Name	*Model	*Purchase Price	*Purchase Date
*Store Name	*Address of Store Where Product Was Purchased.		

(!) IMPORTANT: Photocopy your entire submission for your records. You could be required to mail these photocopies.

This rebate is for the benefit of Massachusetts electric customers of: Unitil, National Grid, Cape Light Compact, Western Massachusetts Electric Company and NSTAR. This rebate offer is available to all Massachusetts residential electric customers of participating utilities and energy efficiency service providers and may be subject to change without prior notice. This rebate may not be combined with any other utility or energy efficiency service provider offer; however, it can be combined with American Recovery and Reinvestment Act (ARRA) incentives. The participating utility or energy efficiency service provider reserves the right to conduct field inspections to verify installations. Limitation of liability: Participating utility or energy efficiency service provider does not guarantee the performance of installed equipment expressly or implicitly. Customer agrees that the Energy Efficiency Program Provider (EEPP) has the unilateral right to apply for any ISO-NE capacity payments or environmental credits resulting from this energy efficiency project, and agrees not to file for such payments or credits either directly or indirectly. Manufacturer and/or retailer agree to provide the EEPP with such further documentation as the EEPP may request to confirm the EEPP's ownership of such benefits. Rebate check paid in US dollars. For more information, call 1-877-318-8440 or visit www.smartenergy-zone.com/masssave.

FUEL EFFICENT VEHICLE POLICY TOWN OF CHARLTON

DEFINITIONS

Combined city and highway MPG (EPA Combined fuel economy): Combined Fuel Economy means the fuel economy from driving a combination of 43% city and 57% highway miles and is calculated as follows:

=1 / ((0.43/City MPG) + (0.57/Highway MPG))

Drive System: The manner in which mechanical power is directly transmitted from the drive shaft to the wheels. The following codes are used in the drive field:

• AWD = All Wheel Drive: four-wheel drive automatically controlled by the vehicle powertrain system

• 4WD = 4-Wheel Drive: driver selectable four-wheel drive with 2-wheel drive option

• 2WD = 2-Wheel Drive

Heavy-duty truck: A vehicle with a manufacturer's gross vehicle weight rating (GVWR) of more than 8,500 pounds.

POLICY STATEMENT

In an effort to reduce energy use, fuel consumption, and costs associated with energy in the Town of Charlton, the Board of Selectmen hereby adopt this policy to procure only fuel efficient vehicles, in the foreseeable future, whenever such vehicles are commercially and practically available.

APPLICABILITY

This policy applies to all departments and divisions of the Town of Charlton. All regional schools in the town are exempt from this policy.

GUIDELINES

All departments / divisions shall purchase only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and practicable.

The Town of Charlton will maintain an annual vehicle inventory for exempt and non-exempt vehicles. The following information shall be included in the vehicle inventory list:

Appendix C. Criteria 4

Model

Make

Model year

- Year procured
- Drive system
- Weight class
- MPG
- Annual miles given
- Total fuel consumption
- Vehicle function.

A plan for replacing these vehicles will be updated annually with vehicles that meet, at a minimum, the fuel efficiency ratings contained in the most recent guidance for Criteria 4 published by the MA Department of Energy Resources' Green Communities Division. The fuel efficiency ratings contained therein are based on the most recently published US Environmental Protection Agency combined city and highway MPG ratings for vehicles.

The Green Communities' Guidance for Criteria 4 must be checked for upgrades prior to ordering new vehicles.

Based on the 2010 EPA data, vehicles are to have a combined city and highway MPG no less than the following:

• 2 Wheel Drive Car: 29 MPG

• 4 Wheel Drive Car: 24 MPG

• 2 Wheel Drive Small Pick-Up Truck: 21 MPG

• 4 Wheel Drive Small Pick-Up Truck: 19 MPG

• 2 Wheel Drive Standard Pick-Up Truck: 17 MPG

• 4 Wheel Drive Standard Pick-Up Truck: 16 MPG

• 2 Wheel Drive Sport Utility Vehicle: 21 MPG

• 4 Wheel Drive Sport Utility Vehicle: 18 MPG

Note: Hybrid or electric vehicles in these vehicle classes will meet these criteria.

Appendix C. Criteria 4

Exemptions

• Heavy-duty vehicles such as fire-trucks, ambulances, heavy duty trucks and vans and public works trucks are exempt from this criterion.

• Police cruisers are exempt from this criterion. However, Charlton commits to purchasing fuel efficient cruisers when they become commercially available. Police department administrative vehicles must meet fuel efficient requirements unless they are also used as police cruisers.

Vehicle Inventory

Attached to this policy is an inventory of exempt and non-exempt vehicles owned by the town. This inventory shall be updated on an annual basis.

Questions/Enforcement

All inquiries should be directed to the department/division responsible for fleet management and/or fleet procurement. This policy is enforced by the Town Administrator, Board of Selectmen and/or their designee(s).

Fuel Efficient Vehicle Replacement Plan

Replacement Process

All nonexempt vehicles that do not meet the required fuel efficiency standards shall be replaced with fuel efficient vehicles that do meet these standards. Vehicles will be replaced when they are no longer operable, in suitable condition, become not economically viable, or there are other pressing needs for replacement.

There are currently 2 vehicles that do not meet the required fuel efficiency standards per the 2012 vehicle inventory. These vehicles are anticipated to be replaced within the next five to ten years.

Town of Charlton - Vehicle Inventory

#	Dept.	Year	Make/Model	Year Procured	VIN #	Plate	Current Mileage	Annual Mileage	MPG	Fuel Type	Anual Fuel Usage	Exempt?
1	HWY	1984	JOHN DEERE LOADER		DW644CB505004	M3431						Y
2	HWY	1996	FORD F350		2FDKF38F3TCA04408				14	Diesel		Y - HDT
3	OTHER	2000	DODGE CARAVAN		2B4GP24RXYR650189	?????						
4	OTHER	1997	FORD F350		1FDHF38FXVCA04408	?????						Y - HDT
5	HWY	1981	INTERNATIONAL SS8V4		1HTAA1858BHA15606	MF1223						
6	FIRE	2000	FORD CUTAWAY VAN AMBULANCE		1FDXE45F5YHB96448	MF7980						
7	HWY	1997	GRAND CARRIER		SN0412254	- - - -						
8	FIRE	1987	MAXIM PUMPER SZT 3000		S2T -30000-80-3000	MF1221						
9	HWY	1996	MORBANK CHIPPER TRAILER		458SZ0913TW002024	M56019						Y
10	OTHER	1971	EAGER BEAVER TRAILER		3D7140							Y
11	HWY	1995	INTERNATIONAL 20S254		1HTGBMR9SH596860	M65202						
12	FIRE	1994	SIMON DUPLEX FIRE TRUCK		1S91G71D7R1020092	MF7193						Y
13	FIRE	2001	SPARTAN PUMPER		4S7HT23991C038499	MF6936						Y
14	OTHER	1995	FORD TRACTOR		A429758							Y
15	HWY	1996	FORD COLL8F		1FDYK82EXTVA22188	M51800						
16	HWY	1997	FORD COLL8F		1FDYK82E7TVA21984	M72954						
17	HWY	1998	FORD COLL8F		1FDYK82E8TV A22187	M72966						
18	POLICE	1997	FORD CROWN VICTORIA		2FALP71W3VX189505							Y - PC
19	HWY	1997	JOHN DEERE GRADER		DW772BH559866	M56021						Y
20	FIRE	1997	SMEAL HME FIE TRUCK		44KFT428CTE218225							Y
21	FIRE	1997	INTERNATIONAL 40S480		1HTSEAAR8VH466686	MF6824						
22	HWY	1997	INGER COMPRESSOR		273224UBH221	M5744						Y
23	OTHER	1997	CHEVROLET K2500		1GCGK24R2VZ113657							Y - HDT
24	HWY	1997	CHEVROLET 2500		1GCGK24ROVE226417	M57746			~15			Y? - HDT
25	HWY	1988	CUSTOM TRAILER		1YB251753J1B1T531	M56377						Y
26	OTHER	1993	HUDSON TRAILER		10HHSE181P1000002							Y
27	HEALTH	1999	FORD RANGER		1FTYR11V4XTB03259				~17			N
28	OTHER	1999	ELGIN PELICAN SWEEPER		587695	M62781						Y
29	OTHER	1984	CHEVROLET PICKUP		1GCHD34JXEF358441	MF7849						N?
30	OTHER	1988	GMC UTILITY TRUCK		2GDGC34K1J1557746							Y
31	HWY	2001	INTERNATIONAL DUMP		1HTGBAAR31H382378	M63473						Y
32	HWY	2001	INTERNATIONAL DUMP		1 HTSDAAR71 H400434	M65285						Y
33	OTHER	2001	CARGO TRAILER		4X4TSF01C1X051675	MF7986						Y
34	FIRE	2002	INTERNATIONAL RESCUE AMBULANCE		1HTSDADR42H409072	MF8990						Y

GREEN - Needs specific specifications (i.e. 4 clyinder

Appendix C. Criteria 4

TOWN OF CHARLTON - VEHICLE INVENTORY (PAGE 2)

#	Dept.	Year	Make/Model	Year Procured	VIN #	Plate	Current Mileage	Annual Mileage	MPG	Fuel Type	Anual Fuel Usage	Exempt?
35	POLICE	2001	FORD CROWN VICTORIA		2FAFP71WX1X197365							Y - PC
36	POLICE	2001	FORD CROWN VICTORIA		2FAFP71W01X197360							Y - PC
37	OTHER	2002	KARAVAN TRAILER		5KTVVS13152F069632							Y
38	OTHER	2002	STERLING DUMP TRUCK		2FZAAWAK82AK96450							Y
39	FIRE	2000	FORD CROWN VICTORIA		2FAFP71W2YX112237	MF99			~18			N?
40	OTHER	1964	BUFFALO TRAILER		MA31209							Y
41	OTHER	2002	FORD THINK		1FABP225820104530							
42	OTHER	2002	FORD THINK		1FABP2258201 04494							
43	HWY	2001	STERLING 68500 TRUCK		2FZAAWBS31ZF90970	M57419						Y
44	FIRE	2003	FORD SUPER DUTY AMBULANCE		1FDXEF46P83EC79080	MF5642						Y
45	POLICE	2003	FORD CROWN VICTORIA		2FAHP71W43X213746							Y - PC
46	POLICE	2005	FORD CROWN VICTORIA		2FAFP71W75X108731							Y - PC
47	FIRE	2000	FORD CROWN VICTORIA		2EAFP71W7YX112234	MF2236			~18			N?
48	CEMETARY	2005	FORD F350 SUPDER DUTY		1FDWF37YX5EB56848							Y - HDT
49	FIRE	1964	BUFFALO CONSTRUCTION TRAILER		MA31208							Y
50	HWY	2005	FORD F350 SUPER DUTY		1FTWF3157EB39959	M72967						Y
51	OTHER	1969	DODGE EXPRESS		2281879580							Y
52	OTHER	1971	ELGIN SWEEPER		118811432FS4F							Y
53	OTHER	1987	JOHN DEERE LOADER		DW844D513430							Y
54	OTHER	1964	GENERAL TRAILER		841C87LWAW1C8112							Y
55	OTHER	1988	CUSTOM TRAILER		1YB251753J1B1T531							Y
56	OTHER	1997	KARAVAN TRAILER		186K58103VF000186							Y
57	FIRE	1952	GENERAL TRAILER		NA31207							Y
58	FIRE	1977	STEVE UTIUTY TRAILER		9336							Y
59	OTHER	1996	HOMEMADE TRAILER		00001							Y
60	POLICE	2003	FORD CROWN VICTORIA		2FAFP71W73X137417							Y -PC
61	SEWER	1988	CHEVROLET S10 PICKUP		1GCBS14E018196323				18-23			N
62	EMERGENCY MGMT	2006	FORD EXPLORER		1FMEU73E66UA85546							Y? - EV
63	POLICE	2006	FORD EXPEDITION		1FMPU18588LA58629							Y? - EV
64	HWY	2006	JOHN DEERE TRACTOR		LV5525H258185	M54055						Y
65	POLICE	2001	SMART UTIUTY TRAILER		1K9BS08131K118220	M65531						Y
66	POLICE	2002	FORD TAURUS		1FAFP53U12A170209	7671PY			20-21			Y? - PC
67	POLICE	2005	FORD CROWN VICTORIA		2FAFP71W25X127669	MP125D						Y - PC
68	POLICE	2007	FORD CROWN VICTORIA		1FAFP53U27A133466	MP12D						Y - PC
69	POLICE	2007	FORD CROWN VICTORIA		2FAFP71W77X120994	MP303D						Y - PC
70	POLICE	2008	FORD CROWN VICTORIA		2FAFP71V88X111882	M57922						Y - PC

Appendix C. Criteria 4

TOWN OF CHARLTON - VEHICLE INVENTORY (PAGE 3)

#	Dept.	Year	Make/Model	Year Procured	VIN #	Plate	Current Mileage	Annual Mileage	MPG	Fuel Type	Anual Fuel Usage	Exempt?
71	POLICE	2002	CHEVROLET IMPALA		2G1WF55E629270376	89WG90						Y? - PC
72	ASSESSORS	2007	FORD TAURUS		1FAFP53U17A120711	M74015			20			N
73	FIRE	1997	FORD F350 PICKUP		1FTHF36F2VEA51752	MF6808						Y - HDV
74	FIRE	2007	CHEVROEL T C4500 AMBULANCE		1GBE4V1217F409207	MF9587						Y - EV
75	FIRE	1974	MACK AERIAL TRUCK		CF611 FAP1635	MF8964						Y
76	FIRE	2008	FORD EXPEDITION		FMFU16578LA39911	MF7489			14			N? EV?
77	???	2003	CHEVROLET EXPRESS VAN		1GCFG25T931128515	46284						Y - van
78												
79												
80												
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ENERGY STAR Qualified Homes, Version 3 (Rev. 03) Inspection Checklists For National Program Requirements

As described in the ENERGY STAR Qualified Homes National Program Requirements, Version 3 (Rev. 03), one prerequisite for qualification is that a home must meet the requirements of the four attached checklists:

- Thermal Enclosure System Rater Checklist
- HVAC System Quality Installation Contractor Checklist
- HVAC System Quality Installation Rater Checklist
- Water Management System Builder Checklist (or Indoor airPLUS Verification Checklist)[1]

To be eligible for qualification, a home must also meet the other requirements listed in the national program requirements document, including verification of all requirements by a Rater.[2] Note that compliance with these guidelines is not intended to imply compliance with all local code requirements that may be applicable to the home to be built. Where requirements of the local codes, manufacturers' installation instructions, engineering documents, or regional ENERGY STAR programs overlap with the requirements of these guidelines, EPA offers the following guidance:

a. In cases where the overlapping requirements exceed the ENERGY STAR guidelines, these overlapping requirements shall be met;

b. In cases where overlapping requirements conflict with a requirement of these ENERGY STAR guidelines (e.g., slab insulation is prohibited to allow visual access for termite inspections), then the conflicting requirement within these guidelines shall not be met. Qualification shall only be allowed if the rater has determined that no equivalent option is available that could meet the intent of the conflicting requirement of these ENERGY STAR guidelines (e.g., switching from exterior to interior slab edge insulation).

The Rater must review all items on the Rater checklists. Raters are expected to use their experience and discretion to verify that the overall intent of each inspection checklist item has been met (i.e., identifying major defects that undermine the intent of the checklist item versus identifying minor defects that the Rater may deem acceptable). The column titled "N/A," which denotes items that are "not applicable," should be used when the checklist item is not present in the home or conflicts with local requirements.

In the event that a Rater finds an item that is inconsistent with the intent of the inspection checklists, the home cannot earn the ENERGY STAR until the item is corrected. If correction of the item is not possible, the home cannot earn the ENERGY STAR. In the event that an item on a Rater checklist cannot be inspected by the Rater, the home also cannot earn the ENERGY STAR. The only exceptions to this rule are in the Thermal Enclosure System Rater Checklist, where the builder may assume responsibility for verifying a maximum of eight items. This option shall only be used at the discretion of the Rater. When exercised, the builder's responsibility will be formally acknowledged by the builder signing off on the checklist for the item(s) that they verified.

In the event that a Rater is not able to determine whether an item is consistent with the intent (e.g., an alternative method of meeting a checklist requirement has been proposed), then the Rater shall consult their Provider. If the Provider also cannot make this determination, then the Rater or Provider shall report the issue to EPA prior to project completion at: energystarhomes@energystar.gov and will typically receive an initial response within 5 business days. If EPA believes the current program guidelines are sufficiently clear to determine whether the intent has been met, then this guidance will be provided to the Partner and enforced beginning with the house in question. In contrast, if EPA believes the program guidelines require revisions to make the intent clear, then this guidance will be provided to the Partner but only enforced for homes permitted after a specified transition period after the release of the revised guidelines, typically 60 days in length.

This process will allow EPA to make formal policy decisions as Partner questions arise and to disseminate these policy decisions through the periodic release of revised program documents to ensure consistent application of the program guidelines.

The Rater is required to keep electronic or hard copies of the completed and signed checklists The signature of the HVAC technician is required if any of the HVAC equipment specified on the HVAC System Quality Installation Contractor Checklist is installed in the home.

All checklists, including the HVAC System Quality Installation Contractor Checklist and Water Management System Builder Checklist may be completed for a batch of homes using a RESNET-approved sampling protocol to qualify homes as ENERGY STAR. For example, if the approved sampling protocol requires rating one in seven homes, then all of the checklists must be completed for the one required rating.

Rater Name: _____ Rater Company Name: _____ Builder Company Name: _____ HVAC Company Name: _____	☐ Rater has verified that HVAC contractor holds credentials necessary to complete the HVAC System Quality Installation Contractor checklist ☐ Rater has verified that builder is an ENERGY STAR Partner

ENERGY STAR Qualified Homes, Version 3 (Rev. 03) Inspection Checklist Notes

1. A completed and signed Indoor airPLUS Verification Checklist may be submitted in lieu of the Water Management System Builder checklist. Indoor airPLUS is a complimentary EPA label recognizing new homes equipped with a comprehensive set of Indoor Air Quality (IAQ) features. Indoor airPLUS verification can be completed by a Rater during the ENERGY STAR verification process. For more information, see www.epa.gov/indoorairplus
2. The term "Rater" refers to the person completing the third-party inspections required for qualification. This party may be a certified Home Energy Rater, BOP Inspector, or an equivalent designation as determined by a Verification Oversight Organization such as RESNET.

ENERGY STAR Qualified Homes, Version 3 (Rev. 03)
Thermal Enclosure System Rater Checklist

Home Address: _____ City: _____ State:_____

Inspection Guidelines	Must Correct	Builder Verified[1]	Rater Verified	N/A
1. High-Performance Fenestration				
1.1 *Prescriptive Path:* Fenestration shall meet or exceed ENERGY STAR requirements[2]	☐	☐	☐	☐
1.2 *Performance Path*: Fenestration shall meet or exceed 2009 IECC requirements[2]	☐	☐	☐	☐
2. Quality-Installed Insulation				
2.1 Ceiling, wall, floor, and slab insulation levels shall meet or exceed 2009 IECC levels[3,4,5]	☐	☐	☐	☐
2.2 All ceiling, wall, floor, and slab insulation shall achieve RESNET-defined Grade I installation or, alternatively, Grade II for surfaces with insulated sheathing (see checklist item 4.4.1 for required insulation levels)	☐	☐	☐	☐
3. Fully-Aligned Air Barriers[6]				
At each insulated location noted below, a complete air barrier shall be provided that is fully aligned with the insulation as follows: • At interior surface of ceilings in all Climate Zones; also, at interior edge of attic eave in all Climate Zones using a wind baffle that extends to the full height of the insulation. Include a baffle in every bay or a tabbed baffle in each bay with a soffit vent that will also prevent wind washing of insulation in adjacent bays • At exterior surface of walls in all Climate Zones; and also at interior surface of walls for Climate Zones 4-8[7, 8] • At interior surface of floors in all Climate Zones, including supports to ensure permanent contact and blocking at exposed edges[9,10]				
3.1 Walls				
3.1.1 Walls behind showers and tubs	☐	☐	☐	☐
3.1.2 Walls behind fireplaces	☐	☐	☐	☐
3.1.3 Attic knee walls / Sloped attics[11]	☐	☐	☐	☐
3.1.4 Skylight shaft walls	☐	☐	☐	☐
3.1.5 Wall adjoining porch roof	☐	☐	☐	☐
3.1.6 Staircase walls	☐	☐	☐	☐
3.1.7 Double walls	☐	☐	☐	☐
3.1.8 Garage rim / band joist adjoining conditioned space	☐	☐	☐	☐
3.1.9 All other exterior walls	☐	☐	☐	☐
3.2 Floors				
3.2.1 Floor above garage	☐	☐	☐	☐
3.2.2 Cantilevered floor	☐	☐	☐	☐
3.2.3 Floor above unconditioned basement or vented crawlspace	☐	☐	☐	☐
3.3 Ceilings				
3.3.1 Dropped ceiling/soffit below unconditioned attic	☐	☐	☐	☐
3.3.2 Sloped ceilings[11]	☐	☐	☐	☐
3.3.3 All other ceilings	☐	☐	☐	☐
4. Reduced Thermal Bridging				
4.1 For insulated ceilings with attic space above (i.e., non-cathedralized ceilings), uncompressed insulation extends to the inside face of the exterior wall below at the following levels: CZ 1 to 5: ≥ R-21; CZ 6 to 8: ≥ R-30[12]	☐	☐	☐	☐
4.2 For slabs on grade in CZ 4 and higher, 100% of slab edge insulated to ≥ R-5 at the depth specified by the 2009 IECC and aligned with thermal boundary of the walls[4,5]	☐	☐	☐	☐
4.3 Insulation beneath attic platforms (e.g., HVAC platforms, walkways) ≥ R-21 in CZ 1 to 5; ≥ R-30 in CZ 6 to 8	☐	☐	☐	☐
4.4 Reduced thermal bridging at walls (rim / band joists are exempted) using one of the following options:				
4.4.1 Continuous rigid insulation, insulated siding, or combination of the two; ≥ R-3 in Climate Zones 1 to 4, ≥ R-5 in Climate Zones 5 to 8[13,14], **OR**;	☐	☐	☐	☐
4.4.2 Structural Insulated Panels (SIPs), **OR**;	☐	☐	☐	☐
4.4.3 Insulated Concrete Forms (ICFs), **OR**;	☐	☐	☐	☐
4.4.4 Double-wall framing[15], **OR**;	☐	☐	☐	☐
4.4.5 Advanced framing, including all of the items below:				
4.4.5a All corners insulated ≥ R-6 to edge[16], **AND**;	☐	☐	☐	☐
4.4.5b All headers above windows & doors insulated[17], **AND**;	☐	☐	☐	☐
4.4.5c Framing limited at all windows & doors[18], **AND**;	☐	☐	☐	☐
4.4.5d All interior / exterior wall intersections insulated to the same R-value as the rest of the exterior wall[19], **AND**;	☐	☐	☐	☐
4.4.5e Minimum stud spacing of 16" o.c. for 2 x 4 framing in all Climate Zones and, in Climate Zones 5 through 8, 24" o.c. for 2 x 6 framing unless construction documents specify other spacing is structurally required[20]	☐	☐	☐	☐

ENERGY STAR Qualified Homes, Version 3 (Rev. 03)
Thermal Enclosure System Rater Checklist

Inspection Guidelines	Must Correct	Builder Verified[1]	Rater Verified	N/A
5. Air Sealing				
5.1 Penetrations to unconditioned space fully sealed with solid blocking or flashing as needed and gaps sealed with caulk or foam				
5.1.1 Duct / flue shaft	☐	☐	☐	☐
5.1.2 Plumbing / piping	☐	☐	☐	☐
5.1.3 Electrical wiring	☐	☐	☐	☐
5.1.4 Bathroom and kitchen exhaust fans	☐	☐	☐	☐
5.1.5 Recessed lighting fixtures adjacent to unconditioned space ICAT labeled and fully gasketed. Also, if in insulated ceiling without attic above, exterior surface of fixture insulated to ≥ R-10 in CZ 4 and higher to minimize condensation potential.	☐	☐	☐	☐
5.1.6 Light tubes adjacent to unconditioned space include lens separating unconditioned and conditioned space and are fully gasketed [21]	☐	☐	☐	☐
5.2 Cracks in the building envelope fully sealed				
5.2.1 All sill plates adjacent to conditioned space sealed to foundation or sub-floor with caulk. Foam gasket also placed beneath sill plate if resting atop concrete or masonry and adjacent to conditioned space.	☐	☐	☐	☐
5.2.2 At top of walls adjoining unconditioned spaces, continuous top plates or sealed blocking using caulk, foam, or equivalent material	☐	☐	☐	☐
5.2.3 Sheetrock sealed to top plate at all attic/wall interfaces using caulk, foam, or equivalent material. Either apply sealant directly between sheetrock and top plate or to the seam between the two from the attic above. Construction adhesive shall not be used	☐	☐	☐	☐
5.2.4 Rough opening around windows & exterior doors sealed with caulk or foam[22]	☐	☐	☐	☐
5.2.5 Marriage joints between modular home modules at all exterior boundary conditions fully sealed with gasket and foam	☐	☐	☐	☐
5.2.6 All seams between Structural Insulated Panels (SIPs) foamed and/or taped per manufacturer's instructions	☐	☐	☐	☐
5.2.7 In multi-family buildings, the gap between the drywall shaft wall (i.e. common wall) and the structural framing between units fully sealed at all exterior boundary conditions	☐	☐	☐	☐
5.3 Other Openings				
5.3.1 Doors adjacent to unconditioned space (e.g., attics, garages, basements) or ambient conditions gasketed or made substantially air-tight	☐	☐	☐	☐
5.3.2 Attic access panels and drop-down stairs equipped with a durable ≥R-10 insulated cover that is gasketed (i.e., not caulked) to produce continuous air seal when occupant is not accessing the attic [23]	☐	☐	☐	☐
5.3.3 Whole-house fans equipped with a durable ≥R-10 insulated cover that is gasketed and either installed on the house side or mechanically operated [23]	☐	☐	☐	☐

Rater Name: _____ Rater Pre-Drywall Inspection Date: _____ Rater Initials: _____

Rater Name: _____ Rater Final Inspection Date: _____ Rater Initials: _____

Builder Employee: _____ Builder Inspection Date: _____ Builder Initials: _____

Notes:

1. At the discretion of the Rater, the builder may verify up to eight items specified in this checklist. When exercised, the builder's responsibility will be formally acknowledged by the builder signing off on the checklist for the item(s) that they verified.

2. *For Prescriptive Path:* All windows, doors, and skylights shall meet or exceed ENERGY STAR Program Requirements for Residential Windows, Doors, and Skylights – Version 5.0 as outlined at www.energystar.gov/windows. *For Performance Path:* All windows, doors and skylights shall meet or exceed the component U-factor and SHGC requirements specified in the 2009 IECC – Table 402.1.1. If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the U-factor and SHGC value from tables 4 and 14, respectively, in 2005 ASHRAE Fundamentals, Chapter 31. Select the highest U-factor and SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating). Note that the U-factor requirement applies to all fenestration while the SHGC only applies to the glazed portion. The following exceptions apply:

   a. An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements;

   b. An area-weighted average of fenestration products more than 50% glazed shall be permitted to satisfy the SHGC requirements;

c. 15 square feet of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above;

d. One side-hinged opaque door assembly up to 24 square feet in area shall be exempt from the U-factor requirements and shall be excluded from area-weighted averages calculated using a) and b), above;

e. Fenestration utilized as part of a passive solar design shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above. Exempt windows shall be facing within 45 degrees of true south and directly coupled to thermal storage mass that has a heat capacity > 20 btu/ft^{3}x^{o}F and provided in a ratio of at least 3 sq. ft per sq. ft. of south facing fenestration. Generally, thermal mass materials will be at least 2" thick.

3. Insulation levels in a home shall meet or exceed the component insulation requirements in the 2009 IECC - Table 402.1.1. The following exceptions apply:

   a. Steel-frame ceilings, walls, and floors shall meet the insulation requirements of the 2009 IECC – Table 402.2.5. In CZ 1 and 2, the continuous insulation requirements in this table shall be permitted to be reduced to R-3 for steel-frame wall assemblies with studs spaced at 24" on center. This exception shall not apply if the alternative calculations in d) are used;

   b. For ceilings with attic spaces, R-30 shall satisfy the requirement for R-38 and R-38 shall satisfy the requirement for R-49 wherever the full height of uncompressed insulation at the lower R-value extends over the wall top plate at the eaves. This exemption shall not apply if the alternative calculations in d) are used;

   c. For ceilings without attic spaces, R-30 shall satisfy the requirement for any required value above R-30 if the design of the roof/ceiling assembly does not provide sufficient space for the required insulation value. This exemption shall be limited to 500 square ft. or 20% of the total insulated ceiling area, whichever is less. This exemption shall not apply if the alternative calculations in d) are used;

   d. An alternative equivalent U-factor or total UA calculation may also be used to demonstrate compliance, as follows:

      An assembly with a U-factor equal or less than specified in 2009 IECC Table 402.1.3 complies.

      A total building thermal envelope UA that is less than or equal to the total UA resulting from the U-factors in Table 402.1.3 also complies. The insulation levels of all non-fenestration components (i.e., ceilings, walls, floors, and slabs) can be traded off using the UA approach under both the Prescriptive and the Performance path. Note that fenestration products (i.e., windows, skylights, doors) shall not be included in this calculation. Also, note that while ceiling and slab insulation can be included in trade-off calculations, the R-value must meet or exceed the minimum values listed in items 4.1 through 4.3 of the checklist to provide an effective thermal break, regardless of the UA tradeoffs calculated. The UA calculation shall be done using a method consistent with the AHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use a series-parallel path calculation method.

4. Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 12 inches below grade. Slab insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall.

5. Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the house, slab insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab. Post-tensioned slabs with integrated porch foundations are exempted from this requirement in all homes, as are post-tensioned slabs with integrated garage foundations in multi-family buildings, until feasible architectural details can be developed.

6. For purposes of this checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. EPA recommends, but does not require, rigid air barriers.

   Open-cell or closed-cell foam shall have a finished thickness $\geq$ 5.5" or 1.5", respectively, to qualify as an air barrier unless the manufacturer indicates otherwise.

   If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads $\geq$ 1" diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be $\geq$ 6 mil.

7. Band joists are currently exempt from interior air barrier requirement in Climate Zones 4 thru 8, but highly encouraged by EPA as a best practice.

8. Up to 10% of the total exterior wall surface area is exempted from the reduced thermal bridging requirements to accommodate thermal fins, wing walls, masonry fireplaces or similar architectural details.

9. Examples of supports necessary for permanent contact include staves for batt insulation or netting for blown-in insulation. Batts that completely fill a cavity enclosed on all six sides may be used to meet this requirement without the need for supports, even though some compression will occur due to the excess insulation, as long as the compressed value meets or exceeds the required insulation level. Specifically, the following batts may be used in six-sided floor cavities: R-19 batts in 2x6 cavities, R-30 batts in 2x8 cavities, R-38 batts in 2x10 cavities, and R-49 batts in 2x12 cavities. For example, in a home that requires R-19 floor insulation, an R-30 batt may be used in a six-sided 2x8 floor cavity.

10. Fully-aligned air barriers may be installed at the exterior surface of the floor cavity in all Climate Zones if the insulation is installed in contact with this exterior air barrier and the perimeter rim and band joists of the floor cavity are also sealed and insulated to comply with the fully-aligned air barrier requirements for walls.

11. Sloped attics shall meet the air barrier requirements for walls and are defined as sloped surfaces separating conditioned attics from ambient conditions. In contrast, sloped ceilings shall meet the air barrier requirements for ceilings and are defined as sloped surfaces separating conditioned house space from ambient conditions (e.g., sloped ceiling at the perimeter of a bedroom).

12. The minimum designated R-values must be achieved regardless of the trade-offs determined using an equivalent U-factor or UA alternative calculation. Note that if the minimum designated values are used, they must be compensated with higher values elsewhere using an equivalent U-factor or UA alternative calculation in order to meet the overall insulation requirements of the 2009 IECC. Also, note that these requirements can be met by using any available strategy, such as a raised-heel truss, alternate framing that provides adequate space, and/or high-density insulation. In climate zones one through three, one option that will work for most homes is to use 2x6 framing, an R-21 high-density batt, and a wind baffle that only requires 0.5" of clearance.

13. Insulated sheathing rated for water protection can be used as a water resistant barrier if all seams are taped and sealed. If the insulated sheathing is not rated for water protection, it shall be attached directly over a water-resistive barrier and sheathing. In addition, it shall provide the required R-value as demonstrated through either testing in accordance with ASTM C 1363 or by attaining the required R-value at its minimum thickness. If non-insulated structural sheathing is used at corners, advanced framing details listed under requirement 4.4.5 shall be met for those wall sections. Rigid insulation, if used, may be installed on either the interior or exterior side of the wall.

14. Steel framing shall meet the reduced thermal bridging requirements by complying with item 4.4.1 of the checklist.

15. Double-wall framing is defined as any framing method that ensures a continuous layer of insulation covering the studs to at least the R-value required in Section 4.4.1 of the checklist, such as offset double-stud walls, aligned double-stud walls with continuous insulation between the adjacent stud faces, or single-stud walls with 2x2 or 2x3 cross-framing. In all cases, insulation shall fill the entire wall cavity from the interior to exterior sheathing except at windows, doors and other penetrations.

16. All exterior corners shall be constructed to allow access for the installation of $\geq$ R-6 insulation that extends to the exterior wall sheathing. Examples of compliance options include standard-density insulation with alternative framing techniques, such as using three studs per corner, or high-density insulation (e.g., spray foam) with standard framing techniques.

17. Headers shall be minimum R-3 for Climate Zones 1 through 4 and R-5 for Climate Zones 5 through 8 using continuous rigid insulation sheathing, SIP headers, other prefabricated insulated headers, single-member or two-member headers with insulation either in between or on one side, or an equivalent assembly, except where a framing plan provided by the builder, architect, designer, or engineer indicates that full-depth solid headers are the only acceptable option. The rater need not evaluate the structural necessity of the details in the framing plan to qualify the home. Also, the framing plan need only encompass the details in question and not necessarily the entire home. R-value requirement refers to manufacturer's nominal insulation value.

18. Framing at windows shall be limited to a maximum of one pair of king studs and one pair jack studs per window opening to support the header and window sill. Additional jack studs shall be used only as needed for structural support and cripple studs only as needed to maintain on-center spacing of studs.

19. Insulation shall run behind interior/exterior wall intersections using ladder blocking, full length 2"x6" or 1"x6" furring behind the first partition stud, drywall clips, or other equivalent alternative.

20. Vertical framing members shall either be on-center or have an alternative structural purpose (e.g., framing members at the edge of pre-fabricated panels) that is apparent to the rater or documented in a framing plan provided by the builder, architect, designer, or engineer. The rater need not evaluate the structural necessity of the details in the framing plan to qualify the home. Also, the framing plan need only encompass the details in question and not necessarily the entire home. No more than 5% of studs may lack an apparent or documented structural purpose, which is equivalent to one vertical stud for every 30 linear feet of wall, assuming 16" o.c. stud spacing.

21. Light tubes that do not include a gasketed lens are required to be sealed and insulated $\geq$ R-6 for the length of the tube.

22. In Climate Zones 1 through 3, stucco over rigid insulation tightly sealed to windows and doors shall be considered equivalent to sealing rough openings with caulk or foam.

23. Examples of durable covers include, but are not limited to, pre-fabricated covers with integral insulation, rigid foam adhered to cover with adhesive, or batt insulation mechanically fastened to the cover (e.g., using bolts, metal wire, or metal strapping).

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HVAC System Quality Installation Contractor Checklist[1]

Home Address: _____ City: _____ State:_____

System Description[2] _____Cooling system for temporary occupant load?[3] Yes ☐ No ☐

1. Whole-Building Mechanical Ventilation Design[4]	**Cont./Tech. Verified[5]**	**Rater Verified**	**N/A**
1.1 Ventilation system designed to meet ASHRAE 62.2-2010 requirements [6].	☐	☐	-
1.2 Ventilation system does not utilize an intake duct to the return side of the HVAC system unless the system is designed to operate intermittently and automatically based on a timer and to restrict outdoor air intake when not in use (e.g., motorized damper).	☐	☐	-
1.3 Documentation is attached with ventilation system type, location, design rate, and frequency and duration of each ventilation cycle.	☐	☐	-
1.4 If present, continuously-operating vent. & exhaust fans designed to operate during all occupiable hours.	☐	☐	☐
1.5 If present, intermittently-operating whole-house ventilation system designed to automatically operate at least once per day and at least 10% of every 24 hours.	☐	☐	☐
2. Heating & Cooling System Design[4,7] - *Parameters used in the design calculations shall reflect home to be built, specifically, outdoor design temperatures, home orientation, number of bedrooms, conditioned floor area, window area, predominant window performance and insulation levels, infiltration rate, mechanical ventilation rate, presence of MERV6 or better filter, and indoor temperature setpoints = 70°F for heating; 75°F for cooling*			
2.1 Heat Loss / Gain Method: ☐ Manual J v8 ☐ ASHRAE 2009 ☐ Other: _____	☐	☐	-
2.2 Duct Design Method: ☐ Manual D ☐ Other: _____	☐	☐	☐
2.3 Equipment Selection Method: ☐ Manual S ☐ OEM Rec. ☐ Other: _____	☐	☐	-
2.4 Outdoor Design Temperatures:[8] Location:_____ 1%:_____°F 99%:_____°F	☐	☐	-
2.5 Orientation of Rated Home (e.g., North, South): _____	☐	☐	-
2.6 Number of Occupants Served by System:[9] _____	☐	☐	-
2.7 Conditioned Floor Area in Rated Home: _____Sq. Ft.	☐	☐	-
2.8 Window Area in Rated Home: _____Sq. Ft.	☐	☐	-
2.9 Predominant Window SHGC in Rated Home:[10] _____	☐	☐	-
2.10 Infiltration Rate in Rated Home:[11] Summer:_____ Winter:_____	☐	☐	-
2.11 Mechanical Ventilation Rate in Rated Home: _____CFM	☐	☐	-
2.12 Design Latent Heat Gain: _____BTUh	☐	☐	-
2.13 Design Sensible Heat Gain: _____BTUh	☐	☐	-
2.14 Design Total Heat Gain: _____BTUh	☐	☐	-
2.15 Design Total Heat Loss: _____BTUh	☐	☐	-
2.16 Design Airflow: [12] _____CFM	☐	☐	-
2.17 Design Duct Static Pressure:[13] _____ Inches Water Column (IWC)	☐	☐	☐
2.18 Full Load Calculations Report Attached	☐	☐	-
3. Selected Cooling Equipment, If Cooling Equipment to be Installed			
3.1 Condenser Manufacturer & Model: _____	☐	☐	☐
3.2 Condenser Serial #: _____	☐	☐	☐
3.3 Evaporator / Fan Coil Manufacturer & Model: _____	☐	☐	☐
3.4 Evaporator / Fan Coil Serial #: _____	☐	☐	☐
3.5 AHRI Reference #:[14] _____	☐	☐	☐
3.6 Listed Efficiency: _____EER _____SEER	☐	☐	☐
3.7 Metering Device Type: ☐ TXV ☐ Fixed orifice ☐ Other: _____	☐	☐	☐
3.8 Refrigerant Type: ☐ R-410a ☐ Other: _____	☐	☐	☐
3.9 Fan Speed Type: [15] ☐ Fixed ☐ Variable (ECM/ICM) ☐ Other: _____	☐	☐	☐
3.10 Listed Sys. Latent Capacity at Design Cond.[16]: _____BTUh	☐	☐	☐
3.11 Listed Sys. Sensible Capacity at Design Cond.[16]: _____BTUh	☐	☐	☐
3.12 Listed Sys. Total Capacity at Design Cond.[16]: _____BTUh	☐	☐	☐
3.13 If Listed Sys. Latent Capacity (Value 3.10) ≤ Design Latent Heat Gain (Value 2.12), ENERGY STAR qualified dehumidifier installed	☐	☐	☐
3.14 Listed Total Cap. (Value 3.12) is 95-115% of Design Total Heat Gain (Value 2.14) or next nom. Size[17,18]	☐	☐	☐
3.15 AHRI Certificate Attached [14]	☐	☐	☐
4. Selected Heat Pump Equipment, If Heatpump to be Installed			
4.1 AHRI Listed Efficiency: _____ HSPF	☐	☐	☐
4.2 Performance at 17°F: Capacity _____ BTUh Efficiency: _____COP	☐	☐	☐
4.3 Performance at 47°F: Capacity _____ BTUh Efficiency: _____ COP	☐	☐	☐

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5. Selected Furnace, If Furnace to be Installed	Cont./Tech. Verified[5]	Rater Verified	N/A
5.1 Furnace Manufacturer & Model: _____	☐	☐	☐
5.2 Furnace Serial #: _____	☐	☐	☐
5.3 Listed Efficiency: _____ AFUE	☐	☐	☐
5.4 Listed Output Heating Capacity: _____ BTUh	☐	☐	☐
5.5 Listed Output Heat. Cap. (Value 5.4) is 100-140% of Design Total Heat Loss (Value 2.15) or next nom. Size[18,19]	☐	☐	☐
6. Refrigerant Tests - *Run system for 15 minutes before testing* Note: If cold weather makes it impossible to verify proper refrigerant charge, system must include a TXV[20]			
6.1 Outdoor ambient temperature at condenser: _____°F DB	☐	☐	☐
6.2 Return-side air temperature inside duct near evaporator, during cooling mode: _____°F WB	☐	☐	☐
6.3 Liquid line pressure: _____ psig	☐	☐	☐
6.4 Liquid line temperature: _____°F DB	☐	☐	☐
6.5 Suction line pressure: _____ psig	☐	☐	☐
6.6 Suction line temperature: _____°F DB	☐	☐	☐
7. Refrigerant Calculations			
For System with Thermal Expansion Valve (TXV):			
7.1 Condenser saturation temperature: _____°F DB (Using Value 6.3)	☐	☐	☐
7.2 Subcooling value: _____°F DB (Value 7.1 - Value 6.4)	☐	☐	☐
7.3 OEM subcooling goal: _____°F DB	☐	☐	☐
7.4 Subcooling deviation: _____°F DB (Value 7.2 – Value 7.3)	☐	☐	☐
For System with Fixed Orifice:			
7.5 Evaporator saturation temperature: _____°F DB (Using Value 6.5)	☐	☐	☐
7.6 Superheat value: _____°F DB (Value 6.6 – Value 7.5)	☐	☐	☐
7.7 OEM superheat goal: _____°F DB (Using superheat tables and Values 6.1 & 6.2)	☐	☐	☐
7.8 Superheat deviation: _____°F DB (Value 7.6 – Value 7.7)	☐	☐	☐
7.9 Value 7.4 is ±3°F or Value 7.8 is ±5°F	☐	☐	☐
7.10 An OEM test procedure has been used in place of sub-cooling or super-heat process and documentation has been attached that defines this procedure	☐	☐	☐
8. Electrical Measurements			
8.1 Evaporator/air handler fan: ____ amps _____volts _____ watts	☐	☐	☐
8.2 Condenser fan: ____ amps _____volts _____ watts	☐	☐	☐
8.3 Compressor: ____ amps _____volts _____ watts	☐	☐	☐
8.4 Electrical measurements within OEM specified tolerance of nameplate value	☐	☐	☐
9. Air Flow Tests			
9.1 Air volume at evaporator: _____ CFM	☐	☐	☐
9.2 Test performed in which mode? ☐ Heating ☐ Cooing	☐	☐	☐
9.3 Return duct static pressure: _____ IWC Test Hole Location[21]: _____	☐	☐	☐
9.4 Supply duct static pressure: _____ IWC Test Hole Location[21] :_____	☐	☐	☐
9.5 Test hole locations are well-marked and accessible[21]	☐	☐	☐
9.6 Measurement method used: ☐ Anemometer ☐ Pressure matching[22] ☐ Flow grid ☐ Fan curve ☐ Other: _____	☐	☐	☐
9.7 Airflow volume at evaporator (Value 9.1), at fan design speed and full operating load, +/- 15% of the airflow required per system design (Value 2.16) or within range recommended by OEM	☐	☐	☐
10. Air Balance			
10.1 Individual room airflows within the greater of ±20% or 25 CFM of the design / application requirements for the supply and return ducts[23]	☐	☐	☐
10.2 Balancing report indicating quantity of supply and return terminals per room attached	☐	☐	☐
11. System Controls			
11.1 Operating and safety controls meet OEM requirements	☐	☐	☐
12. Drain pan			
12.1 Corrosion-resistant drain pan, properly sloped to drainage system, included[24]	☐	☐	☐

Technician Name[25] _____ Equipment Installation Date: _____
Technician Signature[25] _____ Company: _____
Designer Name[25] _____ System Design Date: _____
Designer Signature[25] _____ Company: _____

ENERGY STAR Qualified Homes, Version 3 (Rev. 03)
HVAC System Quality Installation Contractor Checklist[1]

1. The HVAC System Quality Installation Contractor Checklist is designed to align with the requirements of ASHRAE 62.2-2010 and published addenda and ANSI / ACCA's 5 QI-2007 protocol, thereby improving the performance of HVAC equipment in new homes when compared to homes built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, or HVAC problems (e.g., those caused by a lack of maintenance by occupants). Therefore, this checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance.

   This checklist applies to ventilation systems, split air conditioners, unitary air conditioners, air-source/water-source (i.e., geothermal) heat pumps up to 65,000 Btu/h and furnaces up to 225,000 Btu/h. All other equipment, including boilers, is exempt.

   This checklist shall be provided by the Rater to the HVAC contractor who shall complete one checklist for each system. Upon completion, the HVAC contractor shall return the checklist(s) to the Rater. Alternatively, at the discretion of the contractor and Rater, the Rater may verify any item on this checklist in place of the contractor. When this occurs, the Rater shall check the box of the verified items in the Rater Verified column. The Rater is only responsible for ensuring that the Contractor has completed the Contractor checklist in its entirety and for the items that are checked in the Rater Verified column (if any). The Rater is not responsible for assessing the accuracy of the items in this checklist that are not checked in the Rater Verified column. Instead, it is the contractor's exclusive responsibility to ensure the design and installation comply with the Contractor checklist.

   This checklist with supporting documents may also be used to demonstrate compliance with Indoor airPLUS specifications 4.1, 4.2, 4.5, 4.6, and 7.1.

2. Description of HVAC system location or area served (e.g., "whole-house", "upper level", "lower-level", or "supplemental for excess loads.").

3. Check "Yes" if this system is to handle temporary occupant loads. Such a system may be required to accommodate a significant number of guests on a regular or sporadic basis and shall be handled by a supplemental cooling system (e.g., a small, single-package unit or split-coil unit) or by a system that can shift capacity from zone to zone (e.g., a variable volume system).

4. The person responsible for the heating, cooling, and ventilation design, whether it be the HVAC technician or other qualified HVAC design professional, shall be responsible for completing sections 1 and 2 of this checklist.

5. The 'Cont. / Tech. Verified' column shall be used to indicate items verified by the HVAC Contractor or Technician. The 'Rater Verified' column shall only be used to indicate items verified by the Rater, for homes in which the Rater has agreed to verify and accept responsibility for one or more requirements.

6. For proper procedures, exceptions, and selection methods see ASHRAE 62.2-2010 and published addenda. All components shall be designed and installed per local codes, manufacturers' installation instructions, engineering documents, and regional ENERGY STAR program requirements.

   The system shall have at least one supply or exhaust fan with associated ducts and controls. Local exhaust fans are allowed to be part of an exhaust ventilation system. Outdoor air ducts connected to the return side of an air handler are allowed to be part of a supply ventilation system if manufacturers' requirements for return air temperature are met.

7. Heating and cooling loads shall be calculated, equipment capacity shall be selected, and duct systems shall be sized according to the latest editions of ACCA Manuals J, S, & D, respectively, ASHRAE 2009 Handbook of Fundamentals, or a substantively equivalent procedure.

8. If the design conditions are dictated by a code or regulation, then the requirements of the lawful or controlling authority supersedes the Manual J or ASHRAE default design values. Otherwise, the default values shall be used. The values for the geographically closest location shall be selected or a justification provided for the selected location.

9. The number of occupants among all HVAC systems in the home must be equal to the number of bedrooms, as defined below, plus one. Occupants listed for systems that are indicated in the header as a cooling system for temporary occupant loads, as described in footnote 3, shall be permitted to exceed this limit.

   A bedroom is defined by RESNET as a room or space 70 sq. ft. or greater size, with egress window and closet, used or intended to be used for sleeping. A "den", "library", or "home office" with a closet, egress window, and 70 sq. ft. or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.

   An egress window, as defined in IRC section R310, shall refer to any operable window that provides for a means of escape and access for rescue in the event of an emergency. The egress window definition has been summarized for convenience. The egress window shall:

   - have a sill height of not more than 44 inches above the floor; AND

- have a minimum net clear opening of 5.7 sq. ft.; AND
- have a minimum net clear opening height of 24 in.; AND
- have a minimum net clear opening width of 20 in.; AND
- be operational from the inside of the room without the use of keys, tools or special knowledge

10. "Predominant" is defined as the SHGC value used in the greatest amount of window area in the home
11. Infiltration rate shall reflect value used in confirmed or projected HERS rating for rated home. Alternatively, use "Average" or "Semi-loose" values for the cooling season infiltration rates and "Semi-tight" or "Average" values for the heating season infiltration rates, as defined by ACCA Manual J, Eighth Edition, Version Two.
12. Design airflow is the design value(s) for the blower in CFM, as determined by using the manufacturer's expanded performance data to select equipment, per ACCA Manual S procedures.
13. Design duct static pressure shall account for the installation of a MERV6 or higher filter.
14. All evaporators and condensing units shall be properly matched as demonstrated by an attached AHRI certificate. If an AHRI certificate is not available, a copy of OEM-provided catalog data indicating acceptable combination selection and performance data shall be attached.
15. If whole-house ventilation system utilizes the HVAC air handler, then the fan speed type shall be ECM/ICM, variable speed, and run at a reduced speed during ventilation, or include a controller (e.g., smart cycler) that reduces the ventilation run time by accounting for hours when HVAC system is heating or cooling the home.
16. Listed system capacity at design conditions is to be obtained from the OEM expanded performance data.
17. For cooling systems, the next largest nominal piece of equipment may be used that is available to satisfy the latent and sensible requirements. Single-speed systems generally have OEM nominal size increments of ½ ton. Multi-speed or multi-stage equipment may have OEM nominal size increments of one ton. Therefore, the use of these advanced system types can provide extra flexibility to meet the equipment sizing requirements.
18. Contractors shall perform a load calculation for the specific house plan and orientation of the home to be qualified or, for plans with multiple options or that may be built in more than one orientation, for every option and orientation. If the loads are calculated for multiple orientations and the loads across all orientations vary by $\leq$ 25%, then the largest load shall be permitted to be used for equipment selection for all orientations, subject to the over-sizing limits of ACCA Manual S. Otherwise, the contractor shall group the load for each orientation into a set with $\leq$ 25% variation and equipment selection shall be completed for each set of loads. All other aspects of system design (e.g., duct static pressure, design airflow) shall be completed for the specific orientation and configuration of the home. Note that room-level design airflows determined using Manual J and Manual S may be different than the design values used for a standardized Manual D duct design for each option and orientation. Duct balancing shall be performed to meet the design airflows for each orientation and option.
19. For warm air heating systems, the output capacity must be between 100% and 140% of calculated system load unless a larger size is dictated by the cooling equipment selection.
20. Either factory-installed or field-installed TXV's may be used. For field-installed TXV's, ensure that sensing bulbs are insulated and tightly clamped to the vapor line with good linear thermal contact at the recommended orientation, usually 4 or 8 o'clock.
21. Examples of return or supply duct static pressure measurement locations are: plenum, cabinet, trunk duct, as well as front, back, left or right side. Test hole locations shall be well marked and accessible.
22. The pressure matching method uses a calibrated fan to match the supply plenum pressure produced when the HVAC air handler fan is in operation. The airflow through the calibrated fan that produces the same pressure is assumed to match the HVAC air handler fan airflow.
23. Ducts shall not include coiled or looped ductwork except to the extent needed for acoustical control. Balancing dampers or proper duct sizing shall be used instead of loops to limit flow to diffusers. When balancing dampers are used, they shall be located at the trunk to limit noise unless the trunk will not be accessible when the balancing process is conducted. In such cases, opposable blade dampers or dampers located in the duct boot are permitted.
24. Condensate pan shall be made of corrosion-resistant materials, to include galvanized steel and plastic. Drain pan shall drain condensate to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drainage system; and shall be equipped with a backflow prevention valve when drained to a shared drainage system, such as a storm water management system.
25. HVAC technician signature required prior to submittal to Rater. If the HVAC system design (Sec. 1 & 2) was not completed by the HVAC technician, then the designer shall sign in addition to HVAC technician.

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HVAC System Quality Installation Rater Checklist[1]

Home Address:_____City: _____ State: _____

Inspection Guidelines	Must Correct	Rater Verified	N/A
1. Review of HVAC System Quality Installation Contractor Checklist [2]			
1.1 HVAC System Quality Installation Contractor checklist completed in its entirety and collected for records, along with documentation on ventilation system (1.3), full load calculations (2.18), AHRI certificate (3.15), and balancing report (10.2).	☐	☐	☐
1.2 Review the following parameters related to system cooling design, selection, and installation from the HVAC Contractor checklist (Contractor checklist item # indicated in parenthesis):			
1.2.1 Outdoor design temperatures (2.4) are equal to the 1% and 99% ACCA Manual J design temperatures for contractor-designated design location [3]	☐	☐	☐
1.2.2 Home orientation (2.5) matches orientation of rated home	☐	☐	☐
1.2.3 Number of Occupants (2.6) equals number of occupants in rated home [4]	☐	☐	☐
1.2.4 Conditioned floor area (2.7) is within ±10% of conditioned floor area of rated home	☐	☐	☐
1.2.5 Window area (2.8) is within ±10% of calculated window area of rated home	☐	☐	☐
1.2.6 Predominant window SHGC (2.9) is within 0.1 of predominant value in rated home [5]	☐	☐	☐
1.2.7 Listed latent cooling capacity (3.10) exceeds design latent heat gain (2.12)	☐	☐	☐
1.2.8 Listed sensible cooling capacity (3.11) exceeds design sensible heat gain (2.13)	☐	☐	☐
1.2.9 Listed total cooling capacity (3.12) is 95-115% (or 95-125% for Heat Pumps in Climate Zones 4-8) of design total heat gain (2.14), or next nominal size [6]	☐	☐	☐
1.2.10 HVAC manufacturer and model numbers on installed equipment, contractor checklist (3.1, 3.3, 5.1), and AHRI certificate or OEM catalog data all match [7]	☐	☐	☐
1.2.11 Using reported liquid line (6.3) or suction line (6.5) pressure, corresponding temp. (as determined using pressure/temperature chart for refrigerant type) matches reported condenser (7.1) or evaporator (7.5) saturation temperature (+/- 3 degrees) [8]	☐	☐	☐
1.2.12 Calculated subcooling (7.1 minus 6.4) or superheat (6.6 minus 7.5) value equals reported target subcooling (7.3) or superheat (7.7) temperature [8]	☐	☐	☐
1.3 Rater-verified supply & return duct static pressure <110% of contractor values (9.3, 9.4)	☐	☐	☐
2. Duct Quality Installation - *Applies to All Heating, Cooling, Ventilation, Exhaust, and Pressure Balancing Ducts*			
2.1 Connections and routing of ductwork completed without kinks or sharp bends.[9]	☐	☐	☐
2.2 No excessive coiled or looped flexible ductwork.[10]	☐	☐	☐
2.3 Flexible ducts in unconditioned space not installed in cavities smaller than outer duct diameter; in conditioned space not installed in cavities smaller than inner duct diameter	☐	☐	☐
2.4 Flexible ducts supported at intervals as recommended by mfr. but at a distance ≤ 5 ft.	☐	☐	☐
2.5 Building cavities not used as supply or return ducts unless they meet items 3.2, 3.3, 4.1, and 4.2 of this checklist.	☐	☐	☐
2.6 HVAC ducts, cavities used as ducts, and combustion inlets and outlets may pass perpendicularly through exterior walls but shall not be run within exterior walls unless at least R-6 continuous insulation is provided on exterior side of the cavity, along with an interior and exterior air barrier where required by the Thermal Enclosure System Rater Checklist.	☐	☐	☐
2.7 Quantity & location of supply and return duct terminals match contractor balancing report.	☐	☐	☐
2.8 Bedrooms pressure-balanced using any combination of transfer grills, jump ducts, dedicated return ducts, and/or undercut doors to either: a) provide 1 sq. in. of free area opening per 1 CFM of supply air, as reported on the contractor-provided balancing report; or b) achieve a Rater-measured pressure differential ≤ 3 Pa (0.012 in. w.c.) with respect to the main body of the house when bedroom doors are closed and the air handler is operating.[11]	☐	☐	☐
3. Duct Insulation - *Applies to All Heating, Cooling, Supply Ventilation, and Pressure Balancing Ducts* [12]			
3.1 All connections to trunk ducts in unconditioned space are insulated.	☐	☐	☐
3.2 *Prescriptive Path*: Supply ducts in unconditioned attic have insulation ≥ R-8. *Performance Path*: Supply ducts in unconditioned attic have insulation ≥ R-6.	☐	☐	☐
3.3 All other supply ducts and all return ducts in unconditioned space have insulation ≥ R-6.	☐	☐	☐
4. Duct Leakage - *Applies to All Heating, Cooling, and Balanced Ventilation Ducts*			
4.1 Total Rater-measured duct leakage ≤ 6 CFM25 per 100 sq. ft. of conditioned floor area[13,14]	☐	☐	☐
4.2 Rater -measured duct leakage to outdoors ≤ 4 CFM25 per 100 sq. ft. of conditioned floor area.[13, 14, 15]	☐	☐	☐
4.3 Duct boots sealed to floor, wall, or ceiling using caulk, foam, mastic tape, or mastic paste.	☐	☐	☐

ENERGY STAR Qualified Homes, Version 3 (Rev. 03)
HVAC System Quality Installation Rater Checklist[1]

Inspection Guidelines	Must Correct	Rater Verified	N/A
5. Whole-Building Delivered Ventilation			
5.1 Rater-measured ventilation rate is within 100-120% of HVAC contractor design value (2.11).[16]	☐	☐	☐
6. Controls			
6.1 Air flow is produced when central HVAC fan is energized (set thermostat to "fan").	☐	☐	☐
6.2 Cool air flow is produced when the cooling cycle is energized (set thermostat to "cool").[17]	☐	☐	☐
6.3 Heated air flow is produced when the heating cycle is energized (set thermostat to "heat").[17]	☐	☐	☐
6.4 Continuously-operating ventilation & exhaust fans include readily accessible override controls.	☐	☐	☐
6.5 Ventilation controls labeled, unless function is obvious (e.g., bathroom exhaust fan).	☐	☐	☐
7. Ventilation Air Inlets & Ventilation Source			
7.1 All ventilation air inlets located ≥10 ft. of stretched-string distance from known contamination sources such as stack, vent, exhaust hood, or vehicle exhaust. Exception: ventilation air inlets in the wall ≥ 3 ft. from dryer exhausts and contamination sources exiting through the roof.[18]	☐	☐	☐
7.2 Ventilation air inlets ≥ 2 ft. above grade or roof deck in Climate Zones 1-3 or ≥ 4 ft. above grade or roof deck in Climate Zones 4-8 and not obstructed by snow, plantings, condensing units or other material at time of inspection.	☐	☐	☐
7.3 Ventilation air inlets provided with rodent / insect screen with ≤ 0.5 inch mesh.[19]	☐	☐	☐
7.4 Ventilation air comes directly from outdoors and not from adjacent dwelling units, garages, crawlspaces, or attics.	☐	☐	☐
8. Local Mechanical Exhaust			
In each kitchen and bathroom, system installed that exhausts directly to the outdoors and meets one of the following Rater-measured airflow standards:[16, 20, 21]			
Location / **Continuous Rate** / **Intermittent Rate**[22]			
8.1 Kitchen — ≥ 5 ACH, based on kitchen volume[23] / ≥ 100 CFM[24]	☐	☐	☐
8.2 Bathroom — ≥ 20 CFM / ≥ 50 CFM	☐	☐	☐
8.3 If fans share common exhaust duct, back-draft dampers installed.	☐	☐	☐
8.4 Common exhaust duct not shared by fans in separate dwellings.[25]	☐	☐	☐
8.5 Clothes dryers vented directly to outdoors, except for ventless dryers equipped with a condensate drain.	☐	☐	☐
9. Ventilation & Exhaust Fan Ratings (Exemptions for HVAC and Remote-Mounted Fans)[26]			
9.1 Intermittent supply & exhaust fans rated at ≤ 3 sones by mfr., unless rated flow ≥ 400 CFM	☐	☐	☐
9.2 Continuous supply & exhaust fans rated at ≤ 1 sone by manufacturer.	☐	☐	☐
9.3 Bathroom fans used as part of a whole-house mechanical ventilation system shall be ENERGY STAR qualified; unless rated flow rate ≥ 500 CFM.	☐	☐	☐
10. Combustion Appliances			
10.1 Furnaces, boilers, and water heaters located within the home's pressure boundary are mechanically drafted or direct-vented to outdoors. As an exception, atmospherically vented equipment is allowed in Climate Zone 1-3. For atmospherically vented furnaces, boilers, and water heaters, the Rater has conducted BPI's or RESNET's combustion safety test procedure and determined that the CO test results are less than 25 ppm and the combustion appliance zone depressurization limit is not exceeded.[27, 28, 29]	☐	☐	☐
10.2 For fireplaces that are not mechanically drafted or direct-vented to outdoors, total net rated exhaust flow of the two largest exhaust fans (excluding summer cooling fans) is ≤ 15 CFM per 100 sq. ft. of occupiable space when at full capacity or the Rater has verified that the pressure differential is ≤ 5 Pa using BPI's or RESNET's combustion safety test procedure.[20, 28, 29, 30, 31]	☐	☐	☐
10.3 If unvented combustion appliances other than cooking ranges are located inside the home's pressure boundary, the Rater has conducted RESNET's or BPI's combustion safety test procedure and determined that the ambient CO test results are less than 35 ppm.[32]			
11. Filtration			
11.1 At least one MERV 6 or higher filter installed in each ducted mechanical system.[33]	☐	☐	☐
11.2 All return air and mechanically supplied outdoor air pass through filter prior to conditioning.	☐	☐	☐
11.3 Filter located and installed so as to facilitate access and regular service by the owner.[34]	☐	☐	☐
11.4 Filter access panel includes gasket or comparable sealing mechanism and fits snugly against the exposed edge of filter when closed to prevent bypass.[35]	☐	☐	☐

Rater Name: _____ Date Checklist Inspected: _____

Rater Signature: _____ Rater Company Name: _____

ENERGY STAR Qualified Homes, Version 3 (Rev. 03)
HVAC System Quality Installation Rater Checklist[1]

1. The HVAC System Quality Installation Rater Checklist is designed to align with the requirements of ASHRAE 62.2-2010 and published addenda and ANSI / ACCA's 5 QI-2007 protocol, thereby improving the performance of HVAC equipment in new homes when compared to homes built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems, for instance those caused by a lack of occupant maintenance. Therefore, this checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance. This checklist with supporting documents may also be used to demonstrate compliance with Indoor airPLUS specifications 4.1, 4.2, 4.5, 4.6, and 7.1.
2. The Rater is only responsible for ensuring that the Contractor has completed the Contractor checklist in its entirety and verifying the discrete objective parameters referenced in Section 1 of this checklist, not for assessing the accuracy of the load calculations or field verifications included or to verify the accuracy of every input on the Contractor checklist.
3. The Rater shall either confirm that the contractor selected the geographically closest available location or collect from the contractor a justification for the selected location. The Rater need not evaluate the legitimacy of the justification to qualify the home.
4. The number of occupants among all HVAC systems in the home shall be equal to the number of RESNET-defined bedrooms plus one. Occupants listed for systems for which the header of the contractor checklist indicates that it is designed to handle temporary occupant loads, as defined in footnote 3 of the HVAC System Quality Installation Contractor Checklist, shall be permitted to exceed this limit.
5. "Predominant" is defined as the SHGC value used in the greatest amount of window area in the home.
6. For cooling systems, the next largest nominal piece of equipment may be used that is available to satisfy the latent and sensible requirements. Single-speed systems generally have OEM nominal size increments of ½ ton. Multi-speed or multi-stage equipment may have OEM nominal size increments of one ton. Therefore, the use of these advanced system types can provide extra flexibility to meet the equipment sizing requirements.
7. In cases where the condenser unit is installed after the time of inspection by the Rater, the HVAC manufacturer and model numbers on installed equipment can be documented through the use of photographs provided by the HVAC Contractor after installation is complete.
8. If contractor has indicated that an OEM test procedure has been used in place of a sub-cooling or super-heat process and documentation has been attached that defines this procedure, then the box for "n/a" shall be checked for this item.
9. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter.
10. Ducts shall not include coiled or looped ductwork except to the extent needed for acoustical control. Balancing dampers or proper duct sizing shall be used instead of loops to limit flow to diffusers. When balancing dampers are used, they shall be located at the trunk to limit noise unless the trunk will not be accessible when the balancing process is conducted. In such cases, Opposable Blade Dampers (OBD) or dampers that are located in the duct boot are permitted.
11. For HVAC system with multi-speed fans, the highest design fan speed shall be used when verifying this requirement.
12. EPA recommends, but does not require, that all metal ductwork (e.g., exhaust ducts, duct boots) be insulated and that insulation be sealed to duct boots to prevent condensation.
13. Duct leakage shall be determined and documented by a Rater using a RESNET-approved testing protocol only after all components of the system have been installed (e.g., air handler and register grilles). Leakage limits shall be assessed on a per-system, rather than per-home, basis. Testing of duct leakage to the outside can be waived if all ducts & air handling equipment are located within the home's air and thermal barriers AND envelope leakage has been tested to be less than or equal to half of the Prescriptive Path infiltration limit for the Climate Zone where the home is to be built.
14. For all homes that have less than 1,200 sq ft of conditioned floor area (CFA), total measured duct leakage shall be $\leq$ 8 CFM25 per 100 sq. ft. of CFA and measured duct leakage to outdoors shall be $\leq$ 5 CFM25 per 100 sq. ft. of CFA.
15. If total duct leakage is $\leq$ 4 CFM25 per 100 sq. ft. of conditioned floor area, or $\leq$ 5 CFM25 per 100 sq. ft. of conditioned floor area for homes that have less than 1,200 sq. ft. of conditioned floor area, then leakage to outdoors need not be tested.
16. The whole-house ventilation air flow and local exhaust air flows shall be measured by the Rater using a flow hood, flow grid, anemometer (in accordance with AABC, NEBB or ASHRAE procedures), or substantially equivalent method.
17. In cases where the condenser unit is installed after the time of inspection by the Rater, the Rater is exempt from verifying item 6.2 when the condenser is for an AC unit and also item 6.3 when the condenser is for a heatpump unit.
18. The outlet and inlet of balanced ventilation systems shall meet these spacing requirements unless manufacturer instructions indicate that a smaller distance may be used. However, if this occurs the manufacturer's instructions shall be collected for documentation purposes.
19. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the owner.
20. Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope. Examples include bath exhaust fans, range hoods, and clothes dryers

21. Per ASHRAE 62.2-2010, a bathroom is any room containing a bathtub, shower, spa, or similar source of moisture.
22. An intermittent mechanical exhaust system, where provided, shall be designed to operate as needed by the occupant. Control devices shall not impede occupant control in intermittent systems.
23. Kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, and peninsulas and multiplying by the average ceiling height for this area. Cabinet volume shall be included in the kitchen volume calculation.
24. If the flow rate of the selected exhaust fan is less than 5 ACH, based on kitchen volume, then a vented range hood or appliance-range hood combination is required rather than a remote fan that is not integral to the range. Also, for intermittent kitchen exhaust fans that are integrated with microwaves, a rated air flow rate that is $\geq$ 200 CFM may be used in lieu of measuring the actual air flow rate.
25. Exhaust outlets from more than one dwelling unit may be served by a single exhaust fan if the fan runs continuously or if each outlet has a back-draft damper to prevent cross-contamination when the fan is not running.
26. Fans exempted from this requirement include HVAC air handlers and remote-mounted fans (i.e., fans outside habitable spaces, bathrooms, toilets, and hallways and with $\geq$ 4 ft. ductwork between fan and intake grills). Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
27. Per the 2009 International Mechanical Code, a direct-vent appliance is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere. Furthermore, a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure.
28. The pressure boundary is the primary air enclosure boundary separating indoor and outdoor air. For example, a volume that has more leakage to outside than to conditioned space would be outside the pressure boundary.
29. Raters shall use either the Building Performance Institute's (BPI's) Combustion Safety Test Procedure for Vented Appliances or RESNET's Interim Guidelines for Combustion Appliance Testing and Writing Work Scope and be BPI-certified or RESNET-accredited to follow the protocol.
30. Per ASHRAE 62.2-2010 and pub. addenda, the term "net-exhaust flow" is defined as flow through an exhaust system minus the compensating outdoor airflow through any supply system that is interlocked to the exhaust system. "Net supply flow" is intended to represent the inverse. If net exhaust flow exceeds allowable limit, it shall be reduced or compensating outdoor airflow provided.
31. Per ASHRAE 62.2-2010, occupiable space is any enclosed space inside the pressure boundary and intended for human activities, including, but not limited to, all habitable spaces, toilets, closets, halls, storage and utility areas, and laundry areas. See footnote 26 for definition of "habitable spaces".
32. The minimum volume of combustion air required for safe operation by the manufacturer and/or code shall be met or exceeded. Also, in accordance with the National Fuel Gas Code, ANSI Z223.l/NFPA54, unvented room heaters shall not be installed in bathrooms or bedrooms.
33. Per ASHRAE 62.2-2010, ducted mechanical systems are those that supply air to an occupiable space through ductwork exceeding 10 ft in length and through a thermal conditioning component, except for evaporative coolers. Systems that do not meet this definition are exempt from this requirement. Also, mini-split systems typically do not have MERV-rated filters available for use and are, therefore, also exempted under this version of the guidelines.
34. HVAC filters located in the attic shall be considered accessible to the owner if drop-down stairs provide access to attic and a permanently installed walkway has been provided between the attic access location and the filter.
35. The filter media box (i.e., the component in the HVAC system that houses the filter) may be either site-fabricated by the installer or pre-fabricated by the manufacturer to meet this requirement. These requirements only apply when the filter is installed in a filter media box located in the HVAC system, not when the filter is installed flush with the return grill.

ENERGY STAR Qualified Homes, Version 3 (Rev. 03)
Water Management System Builder Checklist[1,2,3]

Home Address: _____ City: _____ State: _____

Inspection Guidelines	Must Correct	Builder Verified	Rater Verified	N/A
1. Water-Managed Site and Foundation				
1.1 Patio slabs, porch slabs, walks, and driveways sloped ≥ 0.25 in. per ft. away from home to edge of surface or 10 ft., whichever is less.[4]	☐	☐	☐	☐
1.2 Final grade is, or is scheduled by builder to be, sloped ≥ 0.5 in. per ft. away from home for ≥ 10 ft. and back-fill tamped to prevent settling[4]	☐	☐	☐	☐
1.3 Capillary break beneath all slabs (e.g., slab on grade, basement slab) except crawlspace slabs using either:[5]				
1.3.1 4 in. bed of ≥ 0.5 in. clean aggregate covered with ≥ 6 mil polytethylene sheeting lapped 6-12 in. or ≥ 1" extruded polystyrene insulation with taped joints, in direct contact with concrete slab above, **OR;**	☐	☐	☐	☐
1.3.2 4 in. uniform layer of sand overlaid with geotextile drainage matting and covered with sheeting or ≥ 1" extruded polystyrene insulation with taped joints.	☐	☐	☐	☐
1.4 Capillary break for all crawlspace floors using either:[5]				
1.4.1 Concrete slab over ≥6 mil polyethylene sheeting, lapped 6-12 in., **OR;**	☐	☐	☐	☐
1.4.2 ≥ 6 mil polyethylene sheeting, lapped 6-12 in. and either a) lapped up each wall or pier far enough to be fastened with furring strips or equivalent, or b) secured in the ground at the perimeter using stakes.	☐	☐	☐	☐
1.5 Exterior surface of below-grade walls finished as follows: • For poured concrete, concrete masonry, and insulated concrete forms, finish with damp-proofing coating • For wood framed walls, finish with polyethylene and adhesive or other equivalent waterproofing	☐	☐	☐	☐
1.6 Class 1 vapor retarders not installed on the interior side of air permeable insulation in exterior below-grade walls [6]	☐	☐	☐	☐
1.7 Sump pump covers mechanically attached with full gasket seal or equivalent	☐	☐	☐	☐
1.8 Drain tile surrounded with clean gravel and fabric filter[7]	☐	☐	☐	☐
2. Water-Managed Wall Assembly				
2.1 Flashing at bottom of exterior walls with weep holes included for masonry veneer and weep screed for stucco cladding systems, or equivalent drainage system	☐	☐	☐	☐
2.2 Fully sealed continuous drainage plane behind exterior cladding that laps over flashing in Section 2.1. Additional bond-break drainage plane layer provided behind all stucco and non-structural masonry cladding wall assemblies[8]	☐	☐	☐	☐
2.3 Window and door openings fully flashed[9]	☐	☐	☐	☐
3. Water-Managed Roof Assembly				
3.1 Step and kick-out flashing at all roof-wall intersections, extending ≥ 4" on wall surface above roof deck and integrated with drainage plane above[10]	☐	☐	☐	☐
3.2 For homes that don't have a slab-on-grade foundation and do have expansive or collapsible soils, gutters & downspouts provided that empty to lateral piping that deposits water on sloping final grade ≥ 5 ft. from foundation or to underground catchment system ≥ 10 ft. from foundation.[11]	☐	☐	☐	☐
3.3 Self-sealing bituminous membrane or equivalent at all valleys & roof deck penetrations[12]	☐	☐	☐	☐
3.4 In 2009 IECC Climate Zones 5 and higher, self-sealing bituminous membrane or equivalent over sheathing at eaves from the edge of the roof line to > 2 ft. up roof deck from the interior plane of the exterior wall.[12]	☐	☐	☐	☐
4. Water-Managed Building Materials				
4.1 Wall-to-wall carpet *not* installed within 2.5 feet of toilets, tubs, and showers	☐	☐	☐	☐
4.2 Cement board or equivalent moisture-resistant backing material installed on all walls behind tub and shower enclosures composed of tile or panel assemblies with caulked joints. Paper-faced backerboard shall not be used [13]	☐	☐	☐	☐
4.3 In Warm-Humid climates, Class 1 vapor retarders not installed on the interior side of air permeable insulation in above-grade walls, except at shower and tub walls [6]	☐	☐	☐	☐
4.4 Building materials with visible signs of water damage or mold *not* installed[14]	☐	☐	☐	☐
4.5 Interior walls *not* enclosed (e.g., with drywall) if either the framing members or insulation products have high moisture content[15]	☐	☐	☐	☐

Builder Employee: _____

Builder Signature: _____ Date: _____

Builder has completed Builder checklist in its entirety, except for items that are checked in the Rater Verified column (if any) [2]

Rater Signature: _____ Date: _____

ENERGY STAR Qualified Homes, Version 3 (Rev. 03) Water Management System Builder Checklist[1,2,3]

1. The specifications in this checklist are designed to help improve moisture control in new homes compared with homes built to minimum code. However, these features alone cannot prevent all moisture problems. For example, leaky pipes or overflowing sinks or baths can lead to moisture issues and negatively impact the performance of this checklist's specified features.

2. This checklist shall be provided by the Rater to the Builder who shall complete the checklist. Upon completion, the Builder shall return the checklist to the Rater for review. If desired by the Builder, the Rater may verify any item on this checklist. When this occurs, the Rater shall check the box of the verified items in the Rater Verified column. The Rater is only responsible for ensuring that the Builder has completed the Builder checklist in its entirety and for the items that are checked in the Rater Verified column (if any). The Rater is not responsible for assessing the accuracy of the field verifications for items in this checklist that are not checked in the Rater Verified column. Instead, it is the builder's exclusive responsibility to ensure the design and installation comply with the Builder checklist.

3. A completed and signed Indoor airPLUS Verification Checklist may be submitted in lieu of the Water Management System Builder checklist. For more information, see www.epa.gov/indoorairplus

4. Where setbacks limit space to less than 10 ft., swales or drains designed to carry water from foundation shall be provided. Backfill tamping is not required if proper drainage can be achieved using non-settling compact soils, as determined by a certified hydrologist, soil scientist, or engineer.

5. Polyethylene sheeting is not required in Dry (B) climates as shown in 2009 IECC Figure 301.1 and Table 301.1, except in U.S. EPA Zone 1 Radon areas. Polyethylene sheeting is also not required for raised pier foundations with no walls. In areas with free-draining soils, identified as Group 1 in the IRC by a certified hydrologist, soil scientist, or engineer through a site visit, a gravel layer or geotextile matting is not required. EPA recommends, but does not require, radon-resistant features for homes built in EPA Radon Zones 1, 2 and 3. For more information, see www.epa.gov/indoorairplus

6. The 2009 IRC defines Class I vapor retarders as a material or assembly with a rating of $\leq$ 0.1 perm, as defined using the desiccant method with Procedure A of ASTM E 96. The following materials are typically rated at $\leq$ 0.1 perm and therefore shall not be used on the interior side of air permeable insulation in above-grade exterior walls in warm-humid climates or below-grade exterior walls in any climate: rubber membranes, polyethylene film, glass, aluminum foil, sheet metal, foil-faced insulating sheathings, and foil-faced non-insulating sheathings. These materials can be used on the interior side of walls if air permeable insulation is not present (e.g., foil-faced extruded polystyrene rigid insulation board adjacent to a below-grade concrete foundation wall is permitted).

   Note that this list is not comprehensive and other materials with a perm rating $\leq$ 0.1 also shall not be used. Also, if manufacturer specifications for a specific product indicate a perm rating above 0.1, then the material may be used, even if it is in this list. Also note that open-cell and closed-cell foam generally have perm ratings above this limit and may be used unless manufacturer specifications indicate a perm rating $\leq$ 0.1.

   Several exemptions to these requirements apply:
   - Class I vapor retarders, such as ceramic tile, may be used at shower and tub walls;
   - Class I vapor retarders, such as mirrors, may be used if they are mounted with clips or other spacers that allow air to circulate behind them.

7. Protected drain tile shall be installed at the footings of basement and crawlspace walls, level or sloped to discharge to outside grade (daylight) or to a sump pump. The top of each drain tile pipe shall always be below the bottom of the concrete slab or crawlspace floor. Each pipe shall be surrounded with at least 6 inches of ½ to ¾ inch washed or clean gravel. The gravel layer shall be fully wrapped with fabric cloth or drain tile pre-wrapped with a fabric filter to prevent clogging of the drain tile with sediment.

8. Any of the following systems may be used: a monolithic weather-resistant barrier (i.e., house wrap) sealed or taped at all joints; weather resistant sheathings (e.g., faced rigid insulation) fully taped at all "butt" joints; lapped shingle-style building paper or felts; or other water-resistive barrier recognized by ICC-ES or other accredited agency.

9. Include pan flashing at sills, side flashing that extends over pan flashing, and top flashing that extends over side flashing.

10. Intersecting wall siding shall terminate 1 in. above the roof or higher, per manufacturer's recommendations. Continuous flashing shall be installed in place of step flashing for metal and rubber membrane roofs.

11. The assessment of whether the soil is expansive or collapsible shall be completed by a certified hydrologist, soil scientist, or engineer. Gutters shall be not required in dry climates as shown in 2009 IECC Figure 301.1 and Table 301.1. A roof design without gutters is also acceptable if it deposits rainwater to a grade-level rock bed with a waterproof liner and a drain pipe that deposits water on a sloping finish grade $\geq$ 5 ft. from foundation. Rainwater

harvesting systems may also be used to meet this requirement when designed to properly drain overflow, meeting the discharge-distance requirements above.

12. Not required in dry climates as shown in 2009 IECC Figure 301.1 and Table 301.1.
13. Monolithic tub and shower enclosures (e.g., fiberglass with no seams) are exempt from this backing material requirement unless required by the manufacturer. Paper-faced backerboard may only be used behind monolithic enclosures and only if it meets ASTM mold-resistant standards ASTM D3273 or ASTM D6329.
14. If mold is present, effort should be made to remove all visible signs of mold using detergent or other method. If removal methods are not effective, then the material shall be replaced.
15. For wet-applied insulation products, follow manufacturer's drying recommendations. As guidance, EPA recommends that lumber not exceed 18% moisture content.

Appendix D. Criteria 5

Massachusetts Stretch Code Modeling and Cash Flow Analysis[1]
April 2010

780 CMR 120.AA "Appendix 120.AA 'Stretch' Energy Code" was developed to offer cities and towns the option of adopting a more aggressive energy code than the MA baseline energy code (International Energy Conservation Code - IECC 2009). Municipalities who adopt the Stretch Code will meet Criterion 5 of the requirements to be designated as a Green Community. Communities that are designated Green Communities are eligible for grants from an annual pool of up to $10 Million.

Attached are spreadsheets summarizing the energy modeling done on representative homes to illustrate the economic impacts of building a home in MA to the MA Stretch Code. ***The attached analysis illustrates that typical Massachusetts homes can be built to the Stretch Code with a positive cash flow (saving money for the homeowner) in the first year of occupancy.***

Representative homes were modeled that represent the different requirements of the Stretch Code with respect to home size and type of construction:

TYPE OF HOME	HERS RATING REQUIRED	HOME MODELED
< 3000 sf, new construction	70	Small (1,708 sf) Baseline (2,672 sf)
>3000 sf new construction	65	Large (4,462 sf)
< 2000 sf renovation	85	Triple Decker (1700 sf/unit)

All modeling was done using REM/Rate software. The homes were first modeled to meet the IECC 2009 MA baseline energy code as typical new construction or renovation. Annual energy costs of the IECC2009 homes were then determined and used as the baseline for the cash flow analysis. The homes were then modeled to meet the Stretch Code using a least cost analysis to identify typical building envelope and mechanical efficiency upgrades and their estimated costs in MA. Once the HERS targets were reached, the annual energy costs were determined for the Stretch Code homes. The attached spreadsheets show the side-by-side financial comparison of the IECC2009 home and the Stretch Code home with and without implementation of the ENERGY STAR homes program. These results show that a positive cash flow can be obtained in the first year of occupancy in a home built to the Stretch Code under each scenario. The Energy Star homes program is recommended to allow builders to take full advantage of the incentives and support available to them.

It should be noted that these results are representative, but that actual savings and costs will vary for each home. Also, while conservative assumptions were used, and costs used in the analysis are based on average data for the MA and Boston markets, these will vary by location and vendor.

[1] Cash Flow Analysis conducted by Vermont Energy Investment Corporation (VEIC) for DOER.

Appendix D. Criteria 5

Massachusetts Stretch Code Improvement - Cash Flow

Baseline Home (2,672 sf)

	IECC 2009 Code	Stretch Code	Stretch Code - with ENERGY STAR[4,5] -
HERS Index Modeled in REM/Rate	**86**	**70**	**70**
Improvement Measures (changes relative to Basecase)	- Unconditioned basement - Floor, R30 - Walls, R21 - Ceiling, R38 G2 - Heating, 80 AFUE - Cooling, 13 SEER - Water Heating, .59 EF - Duct leakage, 8% - Infiltration, 7 ACH50 - Efficient lighting, 50%	- Ceiling, R38 G1 - Heating, 94 AFUE - Water heating, .62 EF - Infiltration, 4 ACH50 - Efficient lighting, 75% - Exhaust Only Ventilation	- Ceiling, R38 G1 - Heating, 94 AFUE - Water heating, .62 EF - Duct leakage, 6% - Infiltration, 5 ACH50 - Efficient lighting, 80% - Exhaust Only Ventilation
Improvement Costs		$ 2,049	$ 2,155
HERS Rater Fee[1]		$ 900	$ 900
HERS Rater reimbursement[2]		-	$ (650)
ENERGY STAR Incentive[3]		-	$ (650)
Total Improvement Costs		$ 2,949	$ 1,755
Mortgage Interest Rate		6%	6%
Loan Term (Years)		30	30
Annual Incremental Mortgage Payment		$ 214	$ 127
Annual Energy Costs[6]	$ 3,970	$ 3,463	$ 3,454
Annual Energy Savings from Baseline		$ 507	$ 516
Annual Cash Flow	**$ -**	**$ 293**	**$ 389**

[1] Estimated Massachusetts ENERGY STAR Homes Program HERS Rater Fee (Range is from $750-$1500, but typically close to $750). Includes cost for conducting Thermal Bypass Inspection

[2] HERS Rater Fees are reimbursed by the Massachusetts ENERGY STAR Homes program by between $650-900 per unit, depending upon the HERS rating achieved.

[3] Massachusetts ENERGY STAR Homes Program may receive a minimum incentive of $650.

[4] ENERGY STAR requirements have been added to the Stretch Code package.

[5] Stretch code homes may qualify for of $1250 where the HERS rating is ~65 or lower

[6] Annual energy costs are based on most recently available fuel costs, from November 2009. Costs for heating are based on natural gas prices, the least expensive heating fuel. With oil, savings would increase.

Appendix D. Criteria 5

Massachusetts Stretch Code Improvement - Cash Flow

Large Home (4,462 sf)

	IECC 2009 Code	Stretch Code	Stretch Code - with ENERGY STAR[4,5] -
HERS Index Modeled in REM/Rate	**92**	**65**	**65**
Improvement Measures (changes relative to Basecase)	- Unconditioned basement - Floor, R30 - Walls, R21 - Ceiling, R38 G2 - Heating, 80 AFUE - Cooling, 13 SEER - Water Heating, .59 EF - Duct leakage, 8% - Infiltration, 7 ACH50 - Efficient lighting, 50%	- Ceiling, R60 G1 - Heating, 94 AFUE - Water Heating, .62 EF - Duct Leakage, 6% - Infiltration, 3 ACH50 - Efficient Lighting, 90% - Exhaust Only Ventilation	- Ceiling, R60 G1 - Heating, 94 AFUE - Water Heating, .62 EF - Duct Leakage, 6% - Infiltration, 3 ACH50 - Efficient Lighting, 90% - Exhaust Only Ventilation
Improvement Costs		$ 5,576	$ 5,576
HERS Rater Fee[1]		$ 900	$ 900
HERS Rater reimbursement[2]		-	$ (650)
ENERGY STAR Incentive[3]		-	$ (650)
Total Improvement Costs		$ 6,476	$ 5,176
Mortgage Interest Rate		6%	6%
Loan Term (Years)		30	30
Annual Incremental Mortgage Payment		$ 471	$ 376
Annual Energy Costs[6]	$ 6,510	$ 5,055	$ 5,055
Annual Energy Savings from Baseline		$ 1,455	$ 1,455
Annual Cash Flow	**$ -**	**$ 984**	**$ 1,079**

[1] Estimated Massachusetts ENERGY STAR Homes Program HERS Rater Fee (Range is from $750-$1500, but typically close to $750). Includes cost for conducting Thermal Bypass Inspection

[2] HERS Rater Fees are reimbursed by the Massachusetts ENERGY STAR Homes program by between $650-900 per unit, depending upon the HERS rating achieved.

[3] Massachusetts ENERGY STAR Homes Program may receive a minimum incentive of $650.

[4] ENERGY STAR requirements have been added to the Stretch Code package.

[5] Stretch code homes may qualify for of $1250 where the HERS rating is ~65 or lower

[6] Annual energy costs are based on most recently available fuel costs, from November 2009. Costs for heating are based on natural gas prices, the least expensive heating fuel. With oil, savings would increase.

Appendix D. Criteria 5

Massachusetts Stretch Code Improvement - Cash Flow

Small Home (1,708 sf)

	IECC 2009 Code	Stretch Code	Stretch Code - with ENERGY STAR[4,5] -
HERS Index Modeled in REM/Rate	**86**	**70**	**70**
Improvement Measures (changes relative to Basecase)	- Unconditioned basement - Floor, R30 - Walls, R21 - Ceiling, R38 G2 - Heating, 80 AFUE - Cooling, 13 SEER - Water Heating, .59 EF - Duct leakage, 8% - Infiltration, 7 ACH50 - Efficient lighting, 50%	- Ceiling, R60 G1 - Heating, 94 AFUE - Water Heating, .62 EF - Infiltration, 5 ACH50 - Efficient lighting, 75% - Exhaust Only Ventilation	- Ceiling, R60 G1 - Heating, 94 AFUE - Water Heating, .62 EF - Infiltration, 5 ACH50 - Duct leakage, 6% - Efficient lighting, 80% - Exhaust Only Ventilation
Improvement Costs		$ 3,262	$ 3,643
HERS Rater Fee[1]		$ 900	$ 900
HERS Rater reimbursement[2]		-	$ (650)
ENERGY STAR Incentive[3]		-	$ (650)
Total Improvement Costs		$ 4,162	$ 3,243
Mortgage Interest Rate		6%	6%
Loan Term (Years)		30	30
Annual Incremental Mortgage Payment		$ 302	$ 236
Annual Energy Costs[6]	$ 3,754	$ 3,171	$ 3,159
Annual Energy Savings from Baseline		$ 583	$ 595
Annual Cash Flow	**$ -**	**$ 281**	**$ 359**

[1] Estimated Massachusetts ENERGY STAR Homes Program HERS Rater Fee (Range is from $750-$1500, but typically close to $750). Includes cost for conducting Thermal Bypass Inspection

[2] HERS Rater Fees are reimbursed by the Massachusetts ENERGY STAR Homes program by between $650-900 per unit, depending upon the HERS rating achieved.

[3] Massachusetts ENERGY STAR Homes Program may receive a minimum incentive of $650.

[4] ENERGY STAR requirements have been added to the Stretch Code package.

[5] Stretch code homes may qualify for of $1250 where the HERS rating is ~65 or lower

[6] Annual energy costs are based on most recently available fuel costs, from November 2009. Costs for heating are based on natural gas prices, the least expensive heating fuel. With oil, savings would increase.

Appendix D. Criteria 5

Massachusetts Stretch Code Improvement - Cash Flow		
Cambridge Triple Decker (5,136 sf)		
	IECC 2009 Code	**Stretch Code**
HERS Index Modeled in REM/Rate	**92**	**85**
Improvement Measures (changes relative to Basecase)	- Unconditioned basement - Foundation Walls, R0 - Frame Floor, R30 - Walls, R13 - Ceiling, R38 G2 - Heating, 80 AFUE - Water Heating, .59 EF - Infiltration, 7 ACH50 - Efficient lighting, 50%	- Infiltration, 4.5 ACH50 - Efficient Lighting, 75% - Exhaust Only Ventilation
Improvement Costs		$ 2,202
HERS Rater Fee1		$ 900
Total Improvement Costs		$ 3,102
Mortgage Interest Rate		6%
Loan Term (Years)		30
Annual Incremental Mortgage Payment		$ 225
Annual Energy Costs2	$ 6,828	$ 6,263
Annual Energy Savings from Baseline		$ 565
Annual Cash Flow	**$ -**	**$ 340**

Notes

[1] Estimated Massachusetts ENERGY STAR Homes Program HERS Rater Fee (Range is from $750-$1500, but typically close to $750). Includes cost for conducting Thermal Bypass Inspection

[2] Annual energy costs are based on most recently available fuel costs, from November 2009. Costs for heating are based on natural gas prices, the least expensive heating fuel. With oil, savings would increase.

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Deep Energy Retrofit Multifamily and Single-family Pilot Guidelines

National Grid is expanding a pilot program to demonstrate Deep Energy Retrofits ("DER") in existing single and multi-family homes in Massachusetts (and in 2011 only for 1 to 4 family buildings in Rhode Island). The goal is ideally to achieve at least 50% better energy performance than a code built or Federal Energy Yardstick home. Financial incentives and targeted technical support are being offered for selected projects in a significant number of dwellings to be completed each year in 2010 through 2012. This pilot is for customers with gas heat in our gas service area. It's for customers who own 1-4 family buildings with any other form of heat in our electric service area, and larger multi-family buildings with electric heat. It may also include gas heat in a town in our electric service area if the gas company there is out of funds for a DER Pilot.

This document describes the following: (1) Incentives for Selected Project, (2) Process Steps, (3) Pilot Project time line, (4) Requirements of Selected Projects, (5) Desired Project Characteristics, (6) Project Team Requirements and (7) Project Selection Process and Selection Criteria.

There are additional program documents, including but not limited to, (1) a two-part project application and (2) the Application for Deep Energy Retrofit ("DER") Contractor and Design Consultant List available at www.powerofaction.com/der/. The prospective project team must include at least one contractor or design consultant from this list

This is not an offer to fund work or constitute a guarantee of savings. Incentive payments will only be made for selected projects which meet pilot requirements, criteria and budget.

A DER is a complex undertaking. Through the DER process an existing home is transformed to a high performance home in which the dynamics of energy, moisture and air flows are changed in both subtle and significant ways. The contractor or consultant who develops the DER design and takes responsibility for its implementation must have a thorough understanding of how the various measures of the DER change energy, moisture and airflow dynamics. This understanding is essential to managing the risks necessarily entailed in changing how a building works.

The name "Deep Energy Retrofit" implies that improving energy performance is the primary objective. In fact, a successfully designed and implemented DER should also result in improved comfort, durability and indoor air quality. Other benefits that might motivate the pursuit of DER include enhanced functionality, increased amenity, and/or opportunities to improve the aesthetic appearance of the building. It is important to keep in mind that the performance benefits of a DER are comprehensive and not limited to energy savings.

1. Incentives for Selected Projects

A. Incentives for Whole Building Deep Energy Retrofits:

1. Level one incentives are for selected projects involving a comprehensive whole building (six sided) enclosure package which meets or approaches the Desired Project Characteristics including for mechanical ventilation, and other high efficiency technology. Reimbursement will be up to 75% of owner's otherwise net cost of the Deep Energy Retrofit up to the maximum in the incentive table below. Please see section 5aii related to incentive adjustments related to air sealing targets. This will apply for projects that did not yet have the second application approved as of 1/1/11.
2. Level two incentives provide additional incentives (only in Massachusetts) for project achieving more advanced levels of performance. Level two incentives are in the amount of 25% of eligible level one incentives up to a maximum of $10,000 per unit. Eligible advanced performance initiatives include the Passive House Institute[1] ("PHI") EnerPhit

[1] In the US, the Passive House Institute US (PHIUS)

program, the Affordable Comfort Institute (ACI) Thousand Home Challenge[2] (THC) Option B, or a Net Zero Energy ("NZE") retrofit project.

B. Incentives for Staged Deep Energy Retrofits

Staged or partial DERs are intended to seize opportunities arising represented by home remodeling and maintenance schedules to place a building firmly on a path toward high performance. Incentives for partials to date for building enclosure improvements were prorated based on thermal impact per sq ft and % surface area treated relative to whole building DER. Staged DERs will be considered on a case by case basis provided that the **measures eligible for incentives are consistent with DER Desired Project Characteristics (see section 5)** and:

1. the project will also save at least 50% of what the full DER would or result in a HERS 70
2. the proposal represents sound building science
3. the application includes a plan and cost projections for a complete DER and includes details that expressly facilitate completion of a full DER at a later date.

We are now considering a limited number of projects (in MA only) that will treat less than 50% of the building enclosure surface - provided the plan also includes complete exterior wall or roof deck insulation build-outs at the time of re-siding or re-roofing. ["Special Component(s) DER"]

Maximum Level One Incentives per Facility

Dwelling Units in Facility	Conditioned Sq Ft Floor Area[3] per Unit	Maximum Project Incentive	Dwelling Units in Facility	Maximum Project Incentive
1	<2000	$35,000	4	$80,000
1	2000 - 2500	$38,000	5	$85,000
1	>2500	$42,000	6	$90,000
2	<1000	$50,000	7	$94,000
2	1000 to 1500	$55,000	8	$98,000
2	>1500	$60,000	9	$102,000
3	n/a	$72,000	=>10	$106,000

Multi-unit and Income Eligibility

- To count as a unit for purposes of incentives apartments must have separate legal egress, bath and kitchen and electric meters. In a building with 3 or less units, apartments must have at least 500 sg.ft.floor space to be eligible.
- **For buildings with 5 or more units only National Grid gas or National Grid electric heat customers are eligible.**
- One master metered gas heated facility may be considered each year based on available funds.
- Public housing is ineligible for DERs
- Other income eligible[4] properties will be under consideration for 2011 put project must declare status AND CAN NOT also accept low income funding such as coordinated through LEAN, the Low Income Energy Affordability Network.

C. Cost Basis and by Measure Maximums for Incentives

Allowable project costs eligible for incentives are limited to net incremental costs, of implementing the DER measures. For example; for super insulation on wall exterior, the

[2] The Thousand Home Challenge goal is to demonstrate energy reduction in homes by 75-90% through; energy efficiency, renewables, community-based solutions, and behavioral choices. http://www.thousandhomechallenge.org/

[3] Conditioned area sq ft incentive ranges apply to interior dimensions of usable living space per to 780 Cmr 5303 Light, Ventilation and Heating and 780 Cmr 5305 Ceiling Height. Only applies to 1-2 family buildings.

[4] Where 50% or more of tenants are regularly at or below 60% of median income.

customers' costs of the insulation material, its installation, special attachments and trim modifications required to accommodate the super insulation would be eligible for incentives, whereas costs for the new siding (or cladding such as stucco) and its installation would not.

For mechanical systems, pilot incentives are limited 50% of costs up to a maximum of $4000 for high efficiency heating and $1000 for cooling. Reimbursement for replacement windows is intended to cover 100% of incremental **cost** above typical replacement cost of $15/sq ft. **National Grid reserves the right to verify the reasonableness of submitted costs which must not exceed reasonable market values**.

D. Exclusions

Projects already underway at time of application process maybe excluded, or accommodated as a staged retrofit. Projects involving demolition and rebuild or new additions must retain a minimum 50% original sq ft of floor. If planned addition or demolition is over 50% of final floor space the project would be excluded but may be eligible for the Major Renovation Pilot or the Energy Star Homes program. Other program incentives may be leveraged or split, but not double paid for same measures. National Grid contest incentives such as "smack downs" or "zero energy challenge" and MASS-SAVE shell measure incentives for the same treated components cannot be combined with Pilot incentives.

E. Technical Support

Through a mutual agreement with the Building America program (http://www1.eere.energy.gov/buildings/building_america/index.html) and Building Science Corporation the pilot will provide thorough, but not unlimited, advanced technical support for the project team. Building Science Corporation and certain of its subcontractors in the Building America program will perform the role of the Technical Team in DER Pilot implementation. Technical support relative to design and implementation of DER measures will be provided to projects by the Technical Team.

NOTE: the Technical Team will provide support to the project primary through the entity on the DER project team designated as having primary responsibility for the design and implementation of the DER project. The party having primary responsibility, or "DER project lead" must be contracted to the building owner unless the owner is also a listed contractor or designer. Technical support provided is predicated on the DER project lead having a solid foundation of understanding in building science, building construction and mechanical systems.

F. Other Funding Resources

Participants are encouraged to explore **additional funding and incentive resources:**

- For information on Tax credits for energy efficiency: www.energy.gov/taxbreaks.htm
- National Grid offers rebate programs for lighting, appliances, heating and water heating equipment, HRVs, central air and mini-split heat pumps. https://www.powerofaction.com/
- The 0% HEAT loan is available up-to $25,000 with terms up-to seven years through Mass-Save in coordination with the DER pilot. www.masssave.com/
- Project teams are encouraged to leverage other resources. Some manufacturers offer products to participants in programs such as THC at very favorable terms

2. Process Steps

A. *Pre-Application intake screening*

National Grid will conduct intake screening and give feedback on possible eligibility and remaining slots for this funding cycle.

- Screening will verify basic eligibility (per the criteria in these DER Guidelines), customer interest, willingness and ability to invest in such a project, as well as planned and compatible non energy improvements. Sincerely interested customers are requested to submit a web form indicating heating fuel type and town and stating intentions relative to the basic scope at https://www.powerofaction.com/der_forms/ .
- Contractors and designers meeting experience and qualification criteria may apply for listing on National Grid's "Deep Energy Retrofit (DER) Participating Contractor and Design Consultant List." www.powerofaction.com/der/
- Customers who do not qualify may be able to participate in other programs[5].

B. ***Review of program description materials*** by customer and contractor including these Guidelines as well as the Deep Energy Retrofit Contractor and Design Consultant List to help customers find contractors.

C. ***Project team formation*** by contractor or designer or housing organization with customer is required. Team formation may be initiated by any party. During the application period National Grid will host a Q&A conference call and may arrange for DER open houses.

D. ***First application*** requires mid-level detailed application that;

1. shows basic project concept and how it will meet pilot requirements and desired characteristics for energy and health safety and durability
2. includes dwelling characteristics and fuel use information, photos, basic description of remodeling or rehab plans, proof of financing,
3. initial estimate of costs of measures, related costs and other funding

E. ***Selection of project pool for stage two*** by technical specialist team[6] and National Grid of best candidates that meet the selection criteria. These candidates will be invited to proceed to the second application stage. Depending upon the mix and volume of viable multi and single family projects proposed some multi-family incentives may move to a negotiated or competitive bid approach.

F. ***Application feedback*** through written reviews, email, phone calls, or other suitable format, the Tech Team and DER program staff will identify opportunities for project refinement and provide feedback on documentation needed as project teams prepare the stage two application.

G. ***Second (more detailed) application*** requires physical representation drawings, floor plan with dimensions, detailed inventory of current and proposed equipment and fenestration suitable for comprehensive review and in some cases building energy modeling. The second application shall fully detail all proposed energy improvements including health and safety including detailed costs, expected incentives, and additional required documentation such as may be required for Level 2 incentive paths, i.e. Passive House EnerPhit, THC, NZE.

H. ***Analysis and review to screen final candidates*** Tech Team and DER program staff will conduct comprehensive in-depth review of proposed projects relative to all desired project characteristics and technical soundness. This review may include in-field inspection.

I. ***Develop final project plans and agreements*** including development of inspection and payment schedules and verification of insurance and that all program requirements are addressed in the plan. (Submitted materials will be cataloged into Exhibit A in the contract.)

J. ***Participation in required workshop*** will be scheduled at intervals each year and required prior to final payment for owner occupied projects.

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[5] Visit www.masssave.com/ for details on any MA utility or program administrator program.

[6] Project teams are expected to keep their own technical support resources throughout planning and implementation which may often add up to 5% to project costs.

K. ***Work commences*** [7] Tech Team conducts onsite technical support and inspections. Any changes to the project plan must be agreed to and accepted by the Program Administrator prior to being implemented in order for the measures involved to maintain eligibility for incentives.

L. ***Program visits*** including for inspections, press coverage, and monitoring for evaluation and mentoring of other contractors will be scheduled with reasonable advance notice.

M. ***Incentive payments*** will be made in up to four stages as work progresses and results are verified of customer fulfillment of agreement and project plan. Payments will be made upon inspection and receipt of proof that measures are installed as specified and paid to the contractor by the customer. Final 50% of level two incentives will be held until full verification which in some cases will require 12 months after completion to verify usage data.

N. ***Open houses and press*-related** communications and visits will continue for subsequent two years for owner occupied1-3 family buildings.

O. Project team to share all utility data and key lessons learned from operating the home with National Grid and Tech Team[8] for up to two (2) year period post completion

P. Deep energy savings and big carbon reductions for your building for generations to come.

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3. Pilot Project Time Table

DER Pilot applications considered on rolling basis according to the schedule outlined in the time table below for 2010 through 2012. In 2012 there will be no Group 2.

Application\Project Time Table	Group 1 - complete current year by November 30	Group 2 - complete next year by April 1 (Not In Rhode Island)
First Application Due	Any time Feb 15 to May 1	Any time before August 15
Review by NGRID team	10 days after receipt	10 days after receipt
Second Application Due	2 weeks after review	2 weeks after review
Project contracts finalization	4 weeks after review	Late-September

- Group 2 projects are to be 50% done in the application year and complete by April 1 of the next calendar year. If quota and budget are filled by Group 1 applicants, Group 2 projects will shift to Group 1 of the following year.
- Depending upon mix of single and multi-family the goal is for 40 to 50 units to be completed each year, this includes approximately five (5) units in RI in 2011.

4. Requirements of Selected Projects

A. Building owner and dwelling must be an eligible National Grid customer on the appropriate rate with the correct heating fuel type

B. Projects involving demolition and rebuild or new additions must; a) retain a minimum 50% original structure, b) also improve the rest of building, and c) treat standard levels of insulation in the addition as non-allowable costs.

C. Design, technical review and approval according to timeline above. Complete installation of energy and related measures per the project application as amended for the final agreement by the time specified in the timetable and agreement. **For a project to be eligible we require a**

[7] See requirements on page 5 regarding timing of blower door test

[8]. Much of the value for the DER Pilot and Building America program and knowledge to support the broader adoption of DER is derived post-completion.

blower door test from the Tech team or with prior permission from an approved 3rd party before work that may disrupt or improve building tightness can begin.

D. Combustion Safety:

i) With the exception of oven\ranges and condensing dryers all combustion appliances including, but not limited to fireplaces, woodstoves, heating and hot water systems must be direct-vent sealed combustion or power vented. National Grid may consider exceptions on a case-by-case basis for outstanding projects in which the project team would need to propose an appropriate solution and get written code official approval on a plan that includes maintaining desired building tightness. This may involve chimney relining, chimney caps, controls, monitoring and feedback devices such as spill switches and CO alarms. Switching fuels is discouraged but acceptable if essential to control project costs while addressing combustion safety or other technical challenges. However this may affect incentives for that equipment and eligibility for National Grid[9] incentives. (See gas heating reference on page 1)

ii) For a home or building with an attached garage the wall between the house and garage as well as any horizontal separation (e.g. floor/ceiling) between the garage and living space must be air-sealed and insulated. The door between the house and garage must be weather-stripped. Air sealing between the garage and living space may be subject to verification by zone-pressure diagnostics to determine adequacy of air separation. No ductwork or air handler devices are permitted to be located in the garage Exception: if other approaches prove a cost prohibitive challenge, the Pilot may consider it acceptable to locate supply ducts within garage ceiling framing provided that there is air impermeable insulation and well seal gypsum wall board between the ducts and the garage space. In addition to applicable code and state law requirements for CO alarms, a CO alarm must be installed in each separate space of the home/building that is adjacent to or above the garage.

E. **Sound Building Science Related to Mechanical Systems and Water Management:** The project plan and implementation must demonstrate sound building physics as it relates to moisture management of the enclosure and effectiveness of the mechanical system configuration. For example, the project must include appropriate flashings, integration of water control materials, and measures to control temperatures of condensing surfaces within assemblies. Also, projects that involve integration of ventilation systems with heating and cooling systems must provide easily operated means to control the amount of ventilation delivered by the ventilation system.

F. If wet basements, asbestos, lead, radon, wood rot and other health\safety and durability issues are present, these must be adequately addressed to meet applicable government standards and as agreed upon per technical review process to be remedied either prior to or during the project. Prior to final payment, the customer must provide documentation and applicable certificates to document remediation of identified hazards. Customers may need to have a home inspection at a cost of about $500 to check potential wood rot and other conditions identified by the team and have those addressed in the plan.

G. Mechanical ventilation which is ASHRAE62.2 compliant and easy to control.

H. Access to the home with reasonable notice for learning and monitoring must be provided

i. Access is required for Indoor Air Quality (IAQ) and energy monitoring and verifiable pre- and post-usage data for a period as soon as application is approved through a minimum of two full heating seasons after the project is completed

ii. Press coverage, photos and a minimum of two open houses are required in the two years after completion for single family and owner occupied projects

[9] However another program administrator\utility may provide similar incentives.

iii. Access for reasonable number of other contractor personnel authorized by the program for on-site training is required.

I. Appliance audits and participation in two workshops including a workshop focusing on lighting and appliance use will be required to reinforce efforts to achieve energy use reductions. Efficient lighting upgrade is required such that at least 90% of sockets have fixture appropriate compact fluorescent lamps ("CFL"), or better, with support by National Grid.

J. For Level two incentives, design must meet the performance threshold of the selected Level 2 incentive program (i.e. EnerPhit, NZE, THC), obtain full certification through the selected program, and validate attainment of the performance threshold with one year of operating data.

K. Participant must demonstrate sufficient financing or other leveraged resources and sign an agreement with additional detail regarding the project plan and implementation.

5. Desired Project Characteristics

A. *Building Enclosure and Mechanical Ventilation Package*

National Grid is seeking projects with building enclosure and mechanical systems modifications including super-insulation wall build-outs, window upgrades and mechanical ventilation systems that dramatically transform a home's performance. Staged retrofits will be addressed as described in section 1B. The list below indicates targets or in some cases ideals for each major building component. In some cases, these targets cannot be readily met as stated. Creative solutions for meeting the intent, such as reducing north/west facing and basement window area are acceptable and encouraged.

i. **Insulation** - targets for effective R-value: roof-R60, above grade wall -R40, below grade wall - R20, basement floor - R10. Thermal bridging needs to be considered fully in estimation of thermal performance and minimized to the extent possible

ii. **Air Sealing Target** – **Ideal** whole house sealed to achieve 0.1 (zero point 1) CFM50 /sq ft of thermal enclosure surface area (6 sides) with high durability materials.

a. Air Sealing incentive adjustments – projects that reach or fail to reach the targets below will have the following adjustments to the overall total incentive:

CFM50 /sq ft of thermal enclosure LEVEL	**% change**
0.1 (zero point 1) or less	+ 5% e.g.$2100 added to $42,000
>.01 and < 0.2 (between zero points 1 and 2)	No change (80% thru 1/1/11 were in this range)
0.2 (zero point 2) or more	- 5% e.g.$2100 subtracted from $42,000
0.25 (zero point 25) or more	-10%
Partial DER <60%[10] *Encl. or Special Component(s) DER*	
Exterior wall included: 0.35 or more	-10%
Exterior wall not included: 0.5 or more	-10%

b. Tightness levels should be maintained by provisions in the plan sufficient to avoid need for or use of window air conditioners. Alternatively, as a last resort in some cases, plans may be accepted where use of window AC is coupled with shading, reusable effective sealing for window unit and cross ventilation, provided units are deployed so as to make for easy removal.

[10] For Partial DER projects treating 60% or more of the building enclosure area, the CFM50/sq ft incentive reduction thresholds in the air sealing table above will be increased by the percentage of building enclosure area not included in the DER project plan. E.G. 80% DER would increase first row level by 20% to 0.12. Exception, if just slab is left out of DER project plan there will be no change in the thresholds.

iii. **Windows and Doors** - target R5 (U ≤ 0.2) whole-unit thermal performance, infiltration resistance performance of ≤ 0.15 CFM/sq ft. of air leakage, per AAMA11 standard infiltration test. Orientation appropriate glazing; windows and doors will be NFRC (National Fenestration Rating Council www.nfrc.org) certified and bear the NFRC performance label; Movable shutters, high performance storm windows or two separate window units within a window opening may be considered as an alternative. Treatment for all windows and doors within in the thermal envelope (which usually includes the basement) must be addressed in the plan.

iv. **Mechanical Ventilation** - Ideal whole building ventilation system that is efficient both of fan energy and heat recovery; balanced, distributed, and automatic; All kitchen stoves/ovens should have an exhaust fan vented to the outside fitted with a damper and a capture hood equal to the size of the stove top. Required: easy to control and complies with ASHRAE 62.2

B. ***Project windows of opportunity*** - at time of residing, new windows or roof, major remodeling including gut remodel, or basement conversion or remediation.

C. ***Completion likely for desired timeframe***

D. ***Project will successfully leverage***:

- customer creativity and dedication to total household energy reductions
- design to achieve and not miss or block opportunities along the path to achieve THC, NZE or PHI thresholds
- measures including; advanced lighting, high efficiency and innovative HVAC and hot water systems, and renewables (note: priority must be given to solar hot water over PV)
- learning opportunities for other contractors and others to learn from project

E. ***Variety*** in projects based on different windows of opportunity and other desired learning **including** different housing types, project types and identification of OPTIMAL approaches.

F. **Cost effectiveness** in total energy related project costs relative to lifetime energy savings.

6. Project Team Requirements

Successful project design, implementation and completion will ideally involve a diverse team to leverage resources and increase the impact of the project. The party to pull a project together could be a customer, general contractor, green remodeler, design professional, energy consultant, nonprofit organization, local government or an educational institution.

Project Team Basic Required Qualifications

- Owner and building must be eligible as described above
- Contracting party must have Massachusetts Home Improvement Contractor (HIC) license
- A qualified general contractor must be on board for duration of the project.
- In most cases an HVAC contractor with experience installing mechanical ventilation integrated with duct work and completing room by room heat loads will be needed.
- Project team must include at least one general contractor or design professional listed on Deep Energy Retrofit ("DER") Contractor and Design Consultant List.
- Eligibility for this list requires prior DER related experience which may include:

[11] AAMA American Architectural Manufacturers Association http://www.aamanet.org/

- ENERGY STAR® Certified homes with Home Energy Rating Score ("HER") scores approaching or below 60, and or remodeling with HERs below 70
- Net Zero Energy or Passive House built or under contract. PHI certification
- Remodeling involving super insulation and extensive blower door verified air sealing.

General Contractor Responsibilities [12]

1. Contractor must be the general contractor and work with the customer and others on project proposal and appropriate sections of the application for pilot.
2. Provide cost detail sufficient to determine incentives and net incremental cost, relative to standard practice, of implementing the DER measures
3. Negotiate costs with customer and agree on final plan with incentives and work schedule
4. Complete project on schedule according to requirements and agreed upon specifications
5. Install measures and, in most cases, the "finish" materials
6. Contribute to maximum learning from project, cooperate with the Pilot implementation team including evaluators
7. General contractor must meet insurance, licensing and experience requirements

7. Project Selection Criteria

The two-stage application process provides many benefits including a phased opportunity for project development\improvement and a process to identify candidates that best meet requirements. Key objectives include a concrete plan that; defines deliverables and timelines, provides cost and other data that's needed for study of DERs, as well as solid building science to best promote efficiency, indoor air quality, durability and occupant health and safety

FIRM CRITERIA: Project and team viability, meets all requirements including funding, timing and comprehensive approach.

PRIORITIES:

- Level 2 incentive (THC, NZE or PHI) preferred provided good value and lifetime savings
- Matches desired project characteristics especially that project will be completed on time[9].
- **No more than three projects involving the same general contractor selected to be in process in a project group (see time table in section (3)).**
- Diversity of project type and variety of house type and super-insulation approaches
- Geographic diversity with some preference for combined gas and electric customers
- Mix of single family and multifamily to fulfill project goals and budget for the year

[12] Contractors may be removed from the list and consideration for a group of projects for failure to complete a project on time

Building Air-Tightness Test Form

Customer Information:

Name: _____

Address: _____

City: _____

State/Zip: _____

Phone: _____

Email:

Building Address: (if different from above)

Street: _____

City/State: _____

Building & Test Conditions:

Date: _____

Time: _____

Floor Area (ft^2): _____

Comments:

Test #1 Depress: _____ Press: _____

Pre-test Baseline Pressure: _____ (Pa)

Bldg Press. (Pa)	Flow Ring Installed	Fan Press (Pa)	Flow (cfm)

Post-test Baseline Pressure: _____ (Pa)

Fan Model/SN: _____

Results:

CFM50: _____

ACH50: _____

Test #2 Depress: _____ Press: _____

Pre-test Baseline Pressure: _____ (Pa)

Bldg Press. (Pa)	Flow Ring Installed	Fan Press (Pa)	Flow (cfm)

Post-test Baseline Pressure: _____ (Pa)

Fan Model/SN: _____

Results:

CFM50: _____

ACH50: _____

HERS Rater Name and Cert. #: _____

HERS Rater Signature and Date: _____

Developed by Advanced Building Analysis, LLC

Appendix D. Criteria 5

Duct Leakage Test Form for MA Code Compliance

Client Information
Name:
Address:
City/State/Zip:
Phone:
Email:

Building Information
Address:
City/State/Zip:
Test Date:
Test Time:
Point of Construction: O Rough O Final

System #1
Location:
Type of Test: O Total / O to Outside
Approx. Floor Area Served:
CFM Leakage at 25pa:
Approx. % leakage for single system*:

System # 2
Location:
Type of Test: O Total / O to Outside
Approx. Floor Area Served:
CFM Leakage at 25pa:
Approx. % leakage for single system*:

System # 3
Location:
Type of Test: O Total / O to Outside
Approx. Floor Area Served:
CFM Leakage at 25pa:
Approx. % leakage for single system*:

System # 4
Location:
Type of Test: O Total / O to Outside
Approx. Floor Area Served:
CFM Leakage at 25pa:
Approx. % leakage for single system*:

System # 5
Location:
Type of Test: O Total / O to Outside
Approx. Floor Area Served:
CFM Leakage at 25pa:
Approx. % leakage for single system*:

Combined Results
Total Conditioned floor area: _____ sq. ft.
Leakage limit: O 6% O 8% O 12%
Leakage limit: cfm@25
Combined Leakage**: _____ cfm@25
2009 IECC Compliance: O Pass O Fail

*Approximations for single systems are for diagnostic use only.
**Total combined duct leakage is required for 2009 IECC Compliance.

I certify that this test was performed in compliance with applicable standards:

_____
Tester's Signature Date

HERS Rater Name:_____

HERS Rater Company:_____

HERS Rater Provider:_____

Developed by Advanced Building Analysis, LLC

Appendix D. Criteria 5

IECC AIR BARRIER CRITERIA

HERS Rater Name and Cert. #:_____ Date:_____

Building Address(es):_____

Builder:_____

TABLE 402.4.2
AIR BARRIER AND INSULATION INSPECTION COMPONENT CRITERIA

COMPONENT	CRITERIA
Air barrier and thermal barrier	Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air-permeable insulation is not used as a sealing material. Air-permeable insulation is inside of an air barrier.
Ceiling/attic	Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop down stair is sealed.
Walls	Corners and headers are insulated. Junction of foundation and sill plate is sealed.
Windows and doors	Space between window/door jambs and framing is sealed.
Rim joists	Rim joists are insulated and include an air barrier.
Floors (including above-garage and cantilevered floors)	Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of insulation.
Crawl space walls	Insulation is permanently attached to walls. Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space are sealed.
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.
Garage separation	Air sealing is provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures are air tight, IC rated, and sealed to drywall. Exception—fixtures in conditioned space.
Plumbing and wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
Shower/tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
Electrical/phone box on exterior walls	Air barrier extends behind boxes or air sealed-type boxes are installed.
Common wall	Air barrier is installed in common wall between dwelling units.
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
Fireplace	Fireplace walls include an air barrier.

HERS Rater Comments:_____

_____

_____

HERS Rater Signature: _____

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Worcester Energy Program
Residential Rebate Pilot

Guide & Requirements

Welcome to Worcester Energy!

Worcester Energy (WE) is an energy efficiency program that encourages residents, businesses and institutions throughout the city to take action to save energy.

A highlight of this program, Residential Rebate Pilot, is designed to encourage eligible home owners throughout the city to make improvements that achieve energy stretch code standards and to share information about their experience saving energy. To find out more about the City of Worcester's current and future efforts related to energy efficiency and creating a greener future, visit www.WorcesterEnergy.org today.

Five Minimum Eligibility Criteria:

- You must be a home owner or owner of an income property in which you reside;
- Your property cannot not have more than 4 dwelling units[1];
- The energy efficiency & conservation improvements you propose should have a simple payback of 10 years or less, after including all utility rebates (more on this later in this guide);
- Your home, after improvements, achieves a Home Energy Rating System (HERS) index of:
    - 80 or less for homes 2,000 square feet or more, or
    - 85 or less for homes with less than 2,000 square feet of heated space.
- Your application for rebate is accurate and complete and you followed all program requirements.

Rebates are available on a first come, first served basis for qualified applicants. The final determination of eligibility is made by Worcester Energy Program, in its discretion, based on your application and the availability of funds.

If you have any questions after reading this guide please e-mail, call or visit the Worcester Energy offices at the addresses noted below.

More information about this program can be found at www.WorcesterEnergy.org.

We look forward to working with you to make "a greener future, today".

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[1] Eligibility of a mixed-use building (commercial & residential) where residential use is a primary use would be determined on a case-by-case basis by the Worcester Energy Program.

GREEN COMMUNITY
Massachusetts Department of Energy Resources
DESIGNATED 2010

Executive Office of Economic Development
Planning & Regulatory Services Division ~ Program
Worcester City Hall, 455 Main Street, Room 404 (4th floor), Worcester, Massachusetts 01608
Telephone: (508) 799-1400 x3 Fax: (508) 799-1406
Email: worcesterenergy@worcesterma.gov
Website: www.WorcesterEnergy.org

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Appendix E. Rebate Program

Summary of the Application Process:

1. Schedule an Energy Use Assessment (no cost, MassSave) or a HERS Rating Test (for a cost, recommended).
2. Select measures from the Energy Use Assessment / Test (above) and obtain a price quote from your home improvement contractor for materials and labor, including available utility incentives.
3. Submit Residential Rebate Pilot Application Form with attachments to the Worcester Energy Program.
4. Within two (2) weeks you will receive an Eligibility Form along with a Pilot Agreement that indicates your rebate amount and details the terms and conditions of the program.
5. Complete and submit the Pilot Agreement and Eligibility Form to the Worcester Energy Program within 15 business days from the date indicated on your Eligibility Form.
6. Complete your home improvement project within six (6) months of the date your Pilot Agreement is signed by the City.
7. Obtain your signed-as-final contractor's Permit to Build form for the work completed (through the City's Dept. of Inspectional Services).
8. Conduct a post-installation HERS Rating Test and obtain an index of 80 or 85 as applicable based on the size of your home.
9. Submit a Rebate Request Form along with items #7 and #8 to the Worcester Energy Program.
10. Your rebate will be mailed to you in four (4) to six (6) weeks, provided you have met all pilot requirements.
11. Participate in a survey designed to capture your experience.

Enjoy your energy efficient home!

Appendix E. Rebate Program

Detailed Summary of the Application Process:

The following provides a detailed step-by-step guide to the Worcester Energy Residential Rebate Pilot application process. All steps must be completed in sequential order.

1.) Obtain a Home Energy Assessment

You have two options:

a) A ***no-cost*** Residential Home Energy Assessment from MassSave.

- To schedule yours, call 1-866-527-7283 or visit www.masssave.com. A MassSave representative will assist you in scheduling an appointment. The typical turnaround time from call to appointment is two (2) to four (4) weeks.
- *Note:* A MassSave energy assessment will not provide you with a HERS rating[2] for your home.

b) Pay for a comprehensive pre-improvement HERS Rating / Test. This service will include a detailed home evaluation and provide cost-effective recommendations for your home improvement project (verify with your HERS Rater what's included).

- Although not required, this test will provide you with your home's current HERS Rating. This will help you and your contractor assess whether your home improvement project will achieve the HERS Rating needed to be eligible for a Worcester Energy rebate before you apply.
- Note that you will still need to conduct a post-installation HERS Test to be eligible for the Residential Rebate Pilot. Ask your HERS testing professional about discounts for pre and post-installation testing. If your completed project meets the Building "Stretch" Code requirements, 20% of your total rebate can be applied toward HERS testing costs. Learn more about HERS at www.resnet.us - Residential Energy Services.

2.) Obtain Contractor Quotes

Based on your Home Energy Assessment, obtain a detailed, line item, quote from a licensed contractor for the recommended energy efficiency & conservation measures you wish to complete. Cost estimates should be broken out by measure and must include all utility incentives. Measures potentially eligible for the Worcester Energy Program Residential Rebate include the following:

- HERS testing (pre and post-installation, up to 20% of the total eligible rebate)
- High efficiency heating and cooling equipment – 94+ AFUE[3] high efficiency heating units and chillers with a SEER[4] rating of 16 or greater.
- High Efficiency on-demand or heat pump DHW systems
- Insulation (closed cell foam and dense-pack cellulose)
- Air-sealing
- Additional measures you propose that can be proven to significantly decrease facility life-cycle energy use will be considered on a case-by-case basis.

3.) Submit Program Application

[2] Home Energy Rating System (HERS) Test index of no more than 80 for dwellings 2,000 square feet or more, or not greater than 85 for dwellings smaller than 2,000 square feet.
[3] US Department of Energy's Annual Fuel Utilization Efficiency (AFUE) rating
[4] Seasonal Energy Efficiency Ratio (SEER)

Submit an accurate and complete **Residential Rebate Pilot Application** for review and approval with all of the following attachments:

- A copy of the MassSave Energy Assessment report or a HERS Rating Test Report (see above #1).
- Contractor quote(s) for the costs of each measure identified in your Home Energy Assessment or HERS Rating / Test Report. Be sure to have your contractor(s) include all eligible utility & government rebates / incentives (see example below).
- Utility usage data for the previous two (2) years from ***all*** (electric, oil, gas, wood etc.) of your energy providers[5] as applicable.
- Hazardous Materials and Substances Form (Exhibit B to the Agreement).

4.) Your application is reviewed by program staff. If found eligible, you will receive the following two (2) forms for signature:

- Eligibility Form
- Residential Rebate Pilot Agreement

The Worcester Energy Program will issue you an Eligibility Form and Residential Rebate Pilot Agreement that details the measures and amounts approved for rebate if post-installation HERS Rating is achieved. Rebates will be based on the material and installation costs of the measures and the simple payback after all utility incentives are included. Measures with a payback of less than 10 years will be eligible for a rebate all others will be considered on a case-by-case basis.

For example, if your Energy Assessment report includes the following:

A	B	C	D	E	F	G
Measure	**Total Installed Cost**	**Less all Utility Incentives**	**Equals: Net Eligible Cost (columns B-C)**	**Estimated Yearly Savings**	**Simple Payback (columns D / E)**	**Eligible Rebate Amount**
Air sealing	$820	$615	$205	$192	1.1	
Foam Insulation	$3,200	$2,400	$800	$315	2.5	
Furnace upgrade	$4,800	$1,050	$3,750	$388	9.7	
On Demand DHW	*$2,700*	*$300*	*$2,400*	*$125*	*19.2*	
Eligible SubTotal:	$8,820	$4,065	$4,755	$895		$2,377
HERS Rating Test	$745		$745			
Eligible Total:			$5,500			**$2,750**

then the first three measures - air sealing, foam insulation and the furnace upgrade - would meet the Pilot's criteria. After adding the eligible HERS Rating Test, you would be

[5] The Application will authorize the City to obtain the utility data for your property for two (2) years following the issuance of the Certificate of Approval by the Department of Inspectional Services from NGRID and NSTAR (using a Utility Data Consent Agreement in the Application). If you are instead or additionally served by other energy provider/s (e.g. for oil or wood), you must provide the City with that information for 2 years following the issuance of the Certificate of Approval.

eligible for 50% of the net eligible costs up to $4,000 per dwelling unit. In this example, 50% of the net eligible sub-total of $5,500 = $2,750. (In this example, up to $1,100 of HERS Rating Test costs would be eligible – 20% of $5,500.)

Important Note: Measures identified in your Energy Assessment may not be approved for a rebate based on the condition of the home, safety concerns, measure's simple payback, energy savings or any other reason, at the sole discretion of the Worcester Energy Program, including, but not limited to, insufficient program funds.

5.) Obtain a Construction Contract (Recommended)

- It is recommended, but not required, that you obtain a contract that includes a scope of work, cost estimates, and a project schedule from the contractor you hire to do the work.
- Changes to your project may change your rebate amount. If there are changes to your home improvement project related to an approved eligible measure or your project includes another potentially eligible measure, you are required to inform the Worcester Energy Program in writing of any such modifications within 14 days for consideration.

6.) Sign and Submit Agreement & Eligibility Form within 15 business days of the date indicated on your Eligibility Form.

- To ensure funds are reserved for your project, you must submit an original signed copy of the following two documents to the Worcester Energy Program :

a) **Residential Rebate Pilot Agreement**

b) **Eligibility Form** (Exhibit A to the Agreement)

7.) Install Approved Equipment and Materials

- Obtain all necessary governmental permits.
- Upon execution of the Agreement, you must install the approved measures in accordance with all Worcester Energy Residential Rebate Pilot requirements. Any violation of the Agreement with the City of Worcester may result in termination from the Pilot.
- *Note*: The City does not guarantee the availability of funds if the Rebate Request Form is not received within six (6) months of the date the Agreement is fully executed (i.e. signed by both the property owner and authorized by City official/s).

8.) Post-Installation – HERS Rating Test and Building Inspection

- Once all measures are installed, you must schedule and complete a post-installation HERS Rating Test. A rating of 80 or lower for dwellings over 2,000 square feet, and a rating of 85 for dwellings less than or equal to 2,000 square feet, is required to receive the rebate funds. If the post-installation HERS rating is higher than required, please contact your contractor quickly to fix the deficiency. You cannot receive a rebate unless your dwelling achieves the rating indicated above. A dwelling is defined as all heated space in the home.

- Once all measures are installed, schedule a building inspection with the City of Worcester, Dept. of Inspectional Services. They can be reached at 508-799-1198 between 8A – 5P, Monday through Friday.
- After the building inspector has completed the inspection, your contractor's Permit to Build form will be signed as Final. Please obtain and keep this document as well as the post-installation HERS Rating Test report.

9.) Submit a Rebate Request

- Submit to the Worcester Energy Program a **Rebate Request Form** with the following completed documents:
  a) Signed as Final contractor's Permit to Build form for the work completed;
  b) Post-Installation HERS rating report;
  c) All applicable invoices indicated in your approved Eligibility Form.

10.) Rebate Request Review and Issuance

- Program staff will review your rebate request for accuracy and completeness and within four (4) to six (6) weeks will issue either your **Rebate Check** or a **Rebate Request Review Letter** explaining why the information you submitted does not meet program requirements.

11.) Post Installation Follow-up

- After you have received your rebate check, you will be contacted to participate in a survey about your experience. As required by the Residential Rebate Pilot Agreement, all applicants may be asked to participate in up to 2 post-installation surveys about participation in the program and the energy savings realized. A case study about your experience may be developed and used to promote the program and report the energy savings achieved.

Thank you for your participation and for helping Worcester make "a greener future, today."

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Worcester Energy Program
Residential Rebate Pilot

Application Instructions

The City of Worcester has allocated monies from its Green Communities Grant to cover the materials, equipment and installation costs of recommended efficiency and conservation measures for eligible home renovation projects. Rebates are capped at 50% of the net eligible costs up to $4,000 per dwelling unit.

1) Applicants must be home owners or owners of an income property in which they reside;
2) Residential dwellings shall not have more than 4 dwelling units[1];
3) Proposed energy efficiency & conservation measures should have simple payback costs of 10 years or less, after all utility rebates have been added;
4) A rating of 80 or lower for dwellings over 2,000 square feet, and a rating of 85 or lower for dwellings less than or equal to 2,000 square feet, is required to receive the rebate funds. Dwelling is defined as all heated space in the home.

Eligible measures will be determined by the Program Manager on a case-by-case basis based on your home's MassSave Energy Assessment or a HERS Rating Test Report and the Contractor(s') Quote(s) for the proposed work.

Your application should include:

- An Energy Assessment (MassSave Energy Assessment or HERS Rating Test Report), which will provide you with a list of energy efficiency & conservation measures and utilities / government rebates you are eligible for;
- A Contractor Quote/s cost estimate(s) broken out by measure and including all utility incentives for the work outlined by the MassSave Energy Assessment or HERS Report.
- Utility usage data for the previous two (2) years from ***all*** (electric, oil, gas, wood etc.) of your energy providers as applicable.
- Submit the completed application package to the City at:

City Hall
Division of Planning & Regulatory Services
Worcester Energy Program
455 Main Street, Room 404
Worcester, MA 01608

Please see the Pilot Guide & Requirements for more information on the Rebate Program process.

[1] Eligibility of a mixed-use building (commercial & residential) where residential use is a primary use would be determined on a case-by-case basis by the Worcester Energy Program Manager.

Worcester Energy Program
Residential Rebate Pilot

Application Form

Applicant/Project Information	
Applicant's Name:	
Owner's Name (if different):	
Address of Property to be assisted: (include city, state, zip):	
Total Number of Dwelling Units in the Building:	
Total Number of Dwelling Units Applied for:	

1) Applicant's Contact & Eligibility Information:

Applicant's Mailing Address (include city, state, zip):	
Applicant's: Home Phone: Cell Phone: E-mail:	
Estimated age of building: years	Are the units occupied? If no, please explain how long each was not occupied:
Heating Fuel Type Oil Natural Gas Electricity Other	

2) If there are commercial uses in the building, please explain their nature, their size (floor square footage), and location within the building. Please state whether or not the heating/cooling system for this space is shared or separate:

3) Are you completing any other home renovation work at this time that is not part of this Application? Please explain.

4) Are you a City of Worcester employee? If yes, please indicate your Department and Supervisor.

5) Fill out requested information in the table below.

Proposed Energy Efficiency/Conservation Measures Description				
	Proposed Energy Efficiency/Conservation Measures Description	Cost ($) of the Measures (per the attached Contractor Quote/s):	Applicable Utilities / Other Governmental Incentives & Rebates (per the attached MassSave Energy Assessment or HERS Rating Test Report):	Remaining Cost after Incentives & Rebates:
1		$	$	$
2		$	$	$
3		$	$	$
4		$	$	$
5		$	$	$
6		$	$	$
7		$	$	$
8		$	$	$

6) By signing below, you verify that all the information provided in this application is accurate and true to the best of your knowledge. You also acknowledge that completing this application does not ensure that your application will be approved and selected for the pilot. If you have questions or need assistance completing this form, please contact us at 508-799-1400 x260 or by email at worcesterenergy@worcesterma.gov.

Applicant's Name (please print):_____

Applicant's Signature: _____ Date: _____

Utility Data Consent Agreement

The Worcester Energy Program's Residential Rebate Pilot is designed to make it easy for participating home owners to receive available National Grid and NStar Gas energy efficiency rebates and incentives and to evaluate the effectiveness of energy efficiency measures that are installed as a result of this pilot.

In order to complete this evaluation, we ask that you sign the consent agreement noted below. This will allow National Grid and NStar Gas to share energy use and billing history (up to 2 years) with us as well as information about any energy upgrades you implement.

Enrollment Information

National Grid

Account Number _____

Account Holder _____

Mailing Address _____

(account location) _____

NStar Gas

Account Number _____

Account Holder _____

Mailing Address _____

(account location) _____

Consent Agreement

I agree to allow National Grid and/or NStar gas to release the energy usage data, billing history and any information on energy upgrades in connection with the address and account number written above (the "Information") to the City of Worcester (collectively, the "Parties") for the purposes of the Worcester Energy Program's Residential Rebate Pilot. I understand this authorization will be valid for two (2) years following the issuance of the Certificate of Approval by the Department of Inspectional Services for this project. I understand that MA Public Record Law will apply to this data.

I agree to release and hold harmless National Grid, NStar Gas and the City of Worcester from any claims, damages or expenses resulting from providing the Information to the Parties or the use of the Information by the Parties.

Please accept this request for information under the authority of this form as if the request was made directly to National Grid and/or NStar Gas who is permitted to accept this form as authentic whether it is the original executed document or a copy thereof. My signature affirms that I have the authority to make and sign this request on behalf of my company.

Owner's Name (please print):_____

Owner's Signature: _____ Date: _____

Appendix E. Rebate Program

Worcester Energy Program

As a Green Community, the City of Worcester is working to adopt policies and create programs that reduce energy consumption & increase energy savings for its residents and businesses.

What is Worcester Energy (WE)?

Worcester Energy is a municipal program aimed at reducing energy use city-wide. *WE*'s Residential Rebate Pilot is focused on assisting homeowners with the costs of making their homes more comfortable & energy efficient.

How is the WE's Residential Rebate Pilot funded?

The Rebate Pilot is funded through a Green Communities Grant awarded to the City by the Massachusetts Department of Energy Resources following Worcester's Designation as a 'Green Community' in 2010.

What should I know about the "Stretch" Building Code?

The City earned the prestigious designation as a Green Community by adopting a number of green policies in 2010, including a more energy efficient Building Code. Also known as the "Stretch Code", this new building code became mandatory July 1, 2011 and "stretches" energy efficiency requirements about 20% beyond the base building code (IECC 2009).

All of the requirements in this Code can be met by utilizing widely available and affordable materials, such as higher performing insulation and more energy efficient heating and cooling systems.

The 'Stretch' building code provides two alternatives for determining compliance: 1) the prescriptive approach, which follows a prescribed set of measures such as EnergyStar, or 2) the performance path, which utilizes Home Energy Rating Tests conducted by a professional.

Please note that to be eligible for this Pilot, the *performance* path needs to be followed.

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City of Worcester
Executive Office of Economic Development
Division of Planning & Regulatory Services

Worcester Energy Program

City Hall
455 Main Street, Room 404
Worcester, MA 01608

Ph: 508-799-1400*260
worcesterenergy@worcesterma.gov

www.WorcesterEnergy.org

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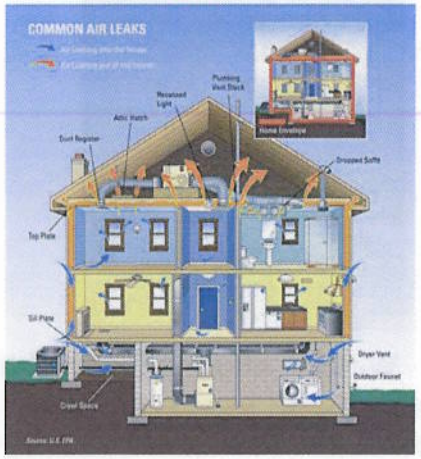
Are your utility bills too high?

Are you thinking of renovating your home?



WE Can Help!

Worcester Energy Program's
Residential **Rebate** Pilot

provides up to $4,000 per dwelling for energy efficient upgrades!

***

Read On To Learn More...
or visit www.WorcesterEnergy.org

2011-2012

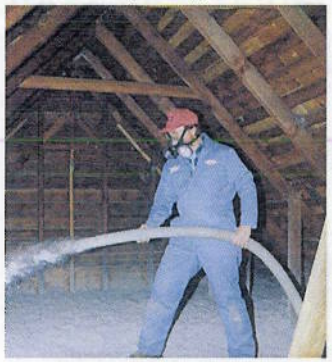
Appendix E. Rebate Program

Worcester Energy Program's Residential Rebate Pilot

How much money is available?

- **Rebates are capped at 50% of the net eligible costs (see below), up to $4,000 per dwelling unit.** For example, a triple-decker would be eligible for up to $12,000 for qualifying retrofits in all three units.
- Funding is available on a first-come, first-served basis.

Foam insulation can stop air leaks & save you money in energy bills!



What is eligible for a rebate?

Rebates will be provided for approved materials, equipment and installation costs for approved energy efficiency and conservation measures, as well as a portion of the HERS Rating Test/s.

Examples:

- Upgrades to high efficiency heating / cooling systems
- High efficiency hot water upgrades
- Upgrades to lighting systems
- Improved wall insulation (closed cell foam or dense-pack cellulose)
- Air-sealing around windows and cracks
- Additional home improvements that can be proven to significantly decrease a home's life-cycle energy use will be considered on a case-by-case basis

Upgrading to high efficiency heating/cooling systems is a smart investment in reducing your energy bills.

Summary of Key Eligibility Requirements:

1. Existing residential buildings with four (4) or fewer dwelling units.
2. Property must be owner occupied or an income property in which the owner resides.
3. Proposed energy efficiency & conservation measures must have a simple payback of 10 years or less, including all other eligible utility incentives.
4. Homes must achieve a HERS rating of ≤80 for those that are more than 2,000 SF, or a rating of ≤85 for homes that are smaller than 2,000 SF per building "stretch" code's performance path (see the back panel for more information).

All rebate eligible work must be completed within 6 months of signing an Agreement with the City.

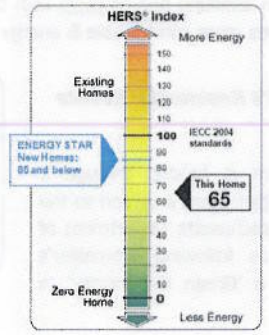
How do I Apply?

Visit www.WorcesterEnergy.org to learn more about this program, view a detailed Pilot Guide & Requirements, and to download an application.

You can also contact or visit the Worcester Energy Program's office 8:30am to 5pm M-F for information about the Residential Rebate Pilot.

What is a Home Energy Rating System (HERS) Test?

HERS Rating Tests are conducted by an independent licensed Home Energy Rater (HERS), and use testing and computer modeling to assign a numerical rating to your home based on its energy use. A HERS Index of 100 represents the energy use of the "American Standard Building" and an Index of 0 (zero) represents a building that uses zero net energy (a Zero Energy Building).



Courtesy of EnergyStar

The Pilot's guide *recommends* pre-installation HERS testing and *requires* post-installation HERS testing. The cost of a post-installation test should be significantly lower if a pre-installation test has already been conducted.

The benefit of a pre-installation HERS test is that it is helpful in determining if Pilot requirements can be achieved before you apply.

HERS testing costs typically range from $500-$1,200 per unit. Contact Residential Energy Services Network (www.resnet.us) for more information.

$$$ Note: If approved, 20% of your eligible measure costs can be applied to the cost of HERS testing.

Images' source: *Courtesy of DOE/NREL*, unless otherwise indicated

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